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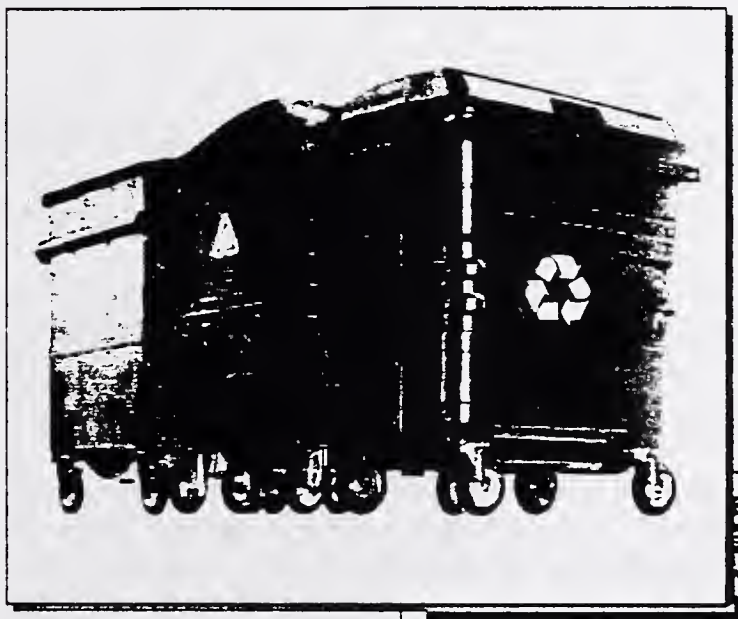
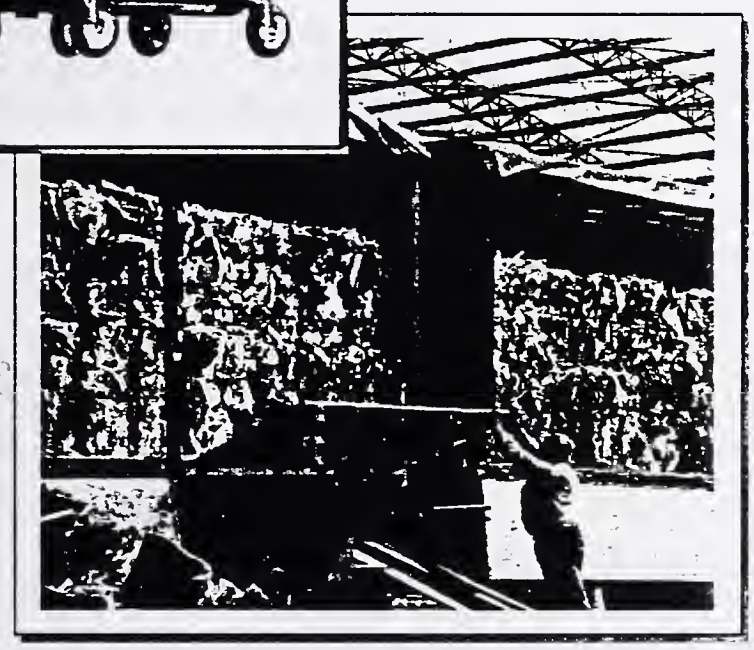
December 20, 2000

Beyond 2000 Solid Waste Master Plan





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A Policy Framework

Executive Office of Environmental Affairs
Massachusetts Department of Environmental Protection

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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ARGEO PAUL CELLUCCI
Governor

JANE SWIFT
Lieutenant Governor

BOB DURAND
Secretary

LAUREN A. LISS
Commissioner

December 20, 2000

Dear Citizen:

I am pleased to present the final *Beyond 2000 Solid Waste Master Plan – A Policy Framework*. This *Plan* lays out the Commonwealth's long term goals for solid waste management, and features the most aggressive goals for waste reduction in the country:

- reducing the waste we produce by 70% through recycling and source reduction;
- removing toxics from the waste stream before recycling or disposal; and
- launching a new Institute (with the University of Massachusetts) to work with manufacturers on product stewardship.

While we are making progress towards meeting the goal of 70% waste reduction, our growing economy has resulted in a waste generation rate that has outpaced our efforts to recycle solid waste. Thus, we are now faced with a need to add capacity for waste disposal. The *Plan* allows for some measured, and more tightly controlled, additional landfill capacity, with a preference for facilities designed to handle residuals from recycling and other waste reduction efforts. No new incineration capacity will be allowed.

Our vision for the coming decade calls for continuous work to reduce the quantity and toxicity of our waste to the maximum extent feasible, so that we only dispose of the irreducible minimum. Adopting this vision is critical to protecting public health and the environment, and moving toward a more sustainable future. Importantly, our vision will require strong partnerships. Residents, businesses, institutions, and all levels of government must take increased responsibility for reducing, reusing, and recycling waste. The waste industry will play a key role in ensuring that all recyclable material is recovered. Manufacturers will need to take more responsibility for their products so that they are less toxic, create less waste, and are easier to recycle.

The *Plan's* vision and policies are based on advice from participants in the Solid Waste Advisory Committee, which includes a broad spectrum of stakeholders, and input from all those who participated in the public hearing process. Stakeholder advice will continue to be important as we develop implementation strategies, and evaluate our results. I would like to thank the Committee for its hard work on this *Plan*, and I look forward to working together with this Committee, and all of you, as we move forward.

Sincerely,

Lauren A. Liss
Commissioner

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TABLE OF CONTENTS

	Page
Executive Summary	i
Chapter One: Introduction	
Purpose and Implementation	1-1
Vision	1-1
Background	1-2
The Importance of Waste Reduction	1-4
Environmental Justice	1-5
Key Challenges	1-5
Chapter Two: Waste Reduction Strategy	
Product Stewardship Initiative	2-1
Source Reduction Strategy	2-3
Source Reduction Goals and Objectives	2-4
Source Reduction Programs	2-4
Toxicity Reduction Strategy	2-6
Toxicity Reduction Goals and Objectives	2-8
Toxicity Reduction Programs	2-8
Recycling Strategy	2-9
Recycling Goals and Objectives	2-12
Recycling Programs	2-13
Food Waste Recycling Initiative	2-16
Promoting Innovative Technologies	2-18
Chapter Three: Generation and Management of Solid Waste	
Solid Waste Generation and Management. 1994-1999	3-1
Total Waste Generation and Management	3-2
Municipal Solid Waste Generation and Management	3-3
Non-Municipal Solid Waste Generation and Management	3-4
Transition to Waste Reduction	3-4
Measuring Waste Reduction	3-6
Measuring Source Reduction	3-7
Chapter Four: Non-Municipal Solid Waste Streams	
Summary of Management Options	4-1
Dependence of Non-MSW Materials on Landfills	4-3
Beneficial Use Determination Review	4-3
Summary of Specific Non-MSW Materials	4-4

Chapter Five: Management Capacity Projections

No Net Import or Net Export Goal..... 5-1
Waste Management Capacity Projections..... 5-1
Disposal Capacity Allocation..... 5-3
Permitting Strategy..... 5-4
Recycling Benefits Plans..... 5-5
Waste Ban Enforcement..... 5-6
Phased Disposal Capacity..... 5-7
Reserve Capacity..... 5-9
Ensuring That Facilities Operate Safely..... 5-9
Site Assignment Regulations..... 5-10
Landfill Permitting and Design Standards..... 5-10
Waste Management Capacity Projection Assumptions..... 5-11

Appendices

Appendix A - Data Collection and Analysis
Appendix B - MSW Management Overview by Municipality
Appendix C - Municipal Recycling Tonnages
Appendix D - Available Municipal Recycling Access by Material
Appendix E - Landfill Capacity
Appendix F - Combustion Capacity
Appendix G - Integrated Solid Waste Management System: Disposal Facilities in 2000
Appendix H - Active Transfer Stations in Massachusetts in 2000
Appendix I - Glossary

Executive Summary

Introduction

The Year 2000 marks the end of a decade of managing solid waste in Massachusetts under the *1990 Solid Waste Master Plan* and its *Updates*. In the last ten years, Massachusetts has made tremendous progress in reducing, reusing, and recycling its waste. We have also worked to ensure that those wastes that are not reused or recycled are disposed of in the most environmentally safe manner possible.

Since 1990, we have reduced waste disposal by an estimated 40 million tons, avoiding the need to build ten 1,500 ton-per-day landfills or combustors. In 1999, our municipal solid waste recycling rate stood at 38%, almost four times the rate in 1990. We have seen the provision of comprehensive recycling services expand to 85% of our population, and have seen tremendous growth in the Massachusetts recycling industry, creating new jobs and adding to the health of our economy and our environment. We have also kept significant quantities of toxic materials from improper disposal through household hazardous product collection programs and have adopted the most stringent mercury emission limits in the nation for our municipal waste combustors coupled with requirements to separate products containing mercury from the waste stream. Finally, we have closed more than 100 unlined landfills that posed potential threats to our groundwater resources. These actions have helped to preserve and sustain the quality of all of our communities.

As we enter the 21st Century, it is time to update our integrated solid waste management strategy to move us closer to our goal of generating and disposing of as little waste as possible. This *Beyond 2000 Solid Waste Master Plan – A Policy Framework* charts our course for the next ten years by providing an overarching policy framework for managing solid waste in the Commonwealth that will lead to a more sustainable future.

Vision and Key Policies

The vision we adopt in this *Plan* is one where we continually work to reduce the quantity and toxicity of our waste to the maximum extent feasible, so that we dispose of the least amount of waste as possible. In short, we must achieve the irreducible minimum amount of waste for disposal. In many ways, the job we face is not different from in the past – we must reduce the amount of waste produced, reuse and recycle as much as possible, take out the toxics, and dispose of what is left in a way that protects public health and the environment.

However, to go beyond the progress we have already made, we must embrace sustainability principles that require us to reverse recent trends of increasing waste generation by generating less waste, and to view discarded material that has served one purpose not as waste, but as a resource for another purpose. This will require us all to take greater responsibility in managing our resources. All of us who produce waste - whether government, institutions, businesses, or citizens - must take greater responsibility for reducing, reusing, and recycling our waste. The waste industry must fully embrace waste reduction services to ensure that all recyclables are

recovered and only the smallest amount of waste is disposed. Manufacturers must take greater responsibility for the products and packaging they produce that unnecessarily and too often end up as waste.

Increasing our ability to reduce waste is a wise investment that will greatly benefit the Commonwealth. Reducing waste generation and increasing recovery of useful materials will add to our economy and promote greater sustainability in our communities, conserve land and natural resources, and result in the need for fewer landfills and combustion facilities with their potentially adverse impacts.

This *Plan* includes a number of key policies and initiatives that will help us achieve our vision over the next ten years:

- **Waste Reduction Milestones** – increase waste reduction capacity and establish new waste reduction milestones that account for source reduction, recycling, and toxicity reduction. By 2010:

  - Achieve 70% waste reduction of municipal solid waste (MSW) and construction and demolition (C&D) debris (60% MSW waste reduction and 88% C&D waste reduction).

  - Substantially reduce the use and toxicity of hazardous products and provide convenient hazardous product collection services to all residents and very small quantity hazardous waste generators.

- **Source Reduction** – place a greater emphasis on reducing waste generation by expanding source reduction programs, especially those targeted at businesses.

- **Product Stewardship** - launch a new initiative with manufacturers to encourage, and in some cases require, them to share in the responsibility for managing the products they produce with the goal of reducing and eliminating toxics and waste, and support the creation of a new national Product Stewardship Institute based in Massachusetts.

- **Multi-family Recycling Legislation** – promote legislation filed by DEP requiring that residents in multi-family units be provided with access to recycling.

- **Unprocessed C&D Waste Ban** – increase recycling of C&D debris by banning the disposal of unprocessed C&D in 2003.

- **Enhanced Waste Ban Enforcement** – hire additional staff to ensure compliance and enforcement of waste bans.

- **Recycling Benefits Plans** – require disposal facilities to implement Recycling Benefits Plans as a way to increase their role in ensuring recovery of recyclables from the waste stream.

- **Stricter Facility Safeguards** – issue revised site assignment and permit regulations to provide increased protection of sensitive receptors from solid waste facilities, including the

evaluation of cumulative impacts associated with new or expanded solid waste facilities, and revise landfill design standards to require all new landfill cells to use a double liner system with leak detection.

- **Disposal Capacity Allocation** – accept applications for landfill capacity that incorporate improved facility safeguards, with a strong preference for residuals landfills that support comprehensive waste processing facilities (no new combustion capacity will be considered).

- **Disposal Capacity Schedule** – phase in landfill capacity on a set schedule to allow time for waste reduction to increase and to prevent overbuilding of capacity.

Need for Increased Integrated Waste Management Capacity

Since 1988, Massachusetts has maintained a policy that encourages the state to maintain enough waste management capacity to meet its own needs. This policy has limited waste disposal capacity to the amount of waste generated within the state that is not recycled, so that on balance we should be neither a net importer nor a net exporter of trash. This *Plan* re-affirms this policy goal, recognizing that we should take responsibility for managing our own solid waste. Providing for our own waste management needs makes sense from both an environmental and economic perspective. Exporting waste does not avoid the potential adverse impacts of disposal, but only changes the location where these impacts occur and creates additional impacts from increased transportation. Exporting waste also means losses in revenues from recyclables recovery.

Currently, our management system is out of balance; we must increase our waste management capacity. This increase in capacity must be done in a way that supports our vision of maximum waste reduction. Therefore, our first priority in addressing our waste management need is to increase our ability to reduce and recycle our waste. This *Plan* lays out a waste reduction strategy that will meet the majority of the waste management need in Massachusetts with additional waste reduction capacity (meeting 78% of the need), and a strategy for meeting the remainder of the waste management need (22%) by phasing in landfill capacity with improved safeguards.

Waste Reduction Strategy

Our waste reduction strategy reaffirms the overall waste management hierarchy established in 1990:

- reduce the amount and toxicity of waste produced;
- recycle the maximum amount of waste that is produced; and
- as a last resort, properly dispose of waste that is not recycled.

Source Reduction

To meet our vision of reducing waste disposal, we must place a greater emphasis than we have in the past on preventing waste in the first place. Source reduction is the most environmentally

preferable and potentially least costly alternative to waste management. Wastes not generated in the first place do not need to be managed, and therefore the costs and impacts of waste management are avoided altogether. Source reduction also includes reuse of materials, which has less environmental impacts than recycling. This *Plan* lays out a strategy that will lead individuals, businesses, and government to take the steps necessary to reduce the amount of waste generated. Key components of our strategy include:

- Use the Product Stewardship Initiative to decrease the amount of packaging for products and provide more reuse opportunities.
- Increase backyard composting of yard, food, and paper waste.
- Promote Pay-As-You-Throw municipal trash programs.
- Promote material exchange networks and other opportunities for reuse of products.
- Promote source reduction concepts in building design and construction.
- Provide education and technical assistance to consumers and businesses on how they can reduce the amount of waste they generate.

Toxicity Reduction

A second but equally important strategy is to reduce the toxicity of waste that is disposed. Many of the products that people routinely throw in the trash contain some toxics. A small amount of toxic material can go a long way in contaminating the environment. Therefore, we must ensure that products contain fewer toxics and that those which do contain toxics are removed from the waste stream for recycling or proper disposal. Key components of our strategy include:

- Use the Product Stewardship Initiative to reduce toxics in products and packaging and ensure proper post-consumer collection and recycling / reuse.
- Pursue key toxics reduction legislation (toxics in consumer products, mercury product stewardship, used oil recycling, Environmental Stewardship Initiative).
- Expand our household hazardous products collection efforts (including convenient collection programs, local and regional permanent collection centers).
- Promote Environmentally Preferable Products purchasing.
- Implement the Material Separation Plans for the Municipal Waste Combustors.
- Ensure that Recycling Benefits Plans include provisions for the separation of toxic products from the waste stream.
- Implement the Massachusetts Zero Mercury Strategy (including working with the health care industry to reduce toxics, promoting mercury bearing products collection, and pursuing mercury labeling/take back legislation).

Recycling

Finally, our strategy includes continuing to increase the recycling of useful materials. Many materials that can be recycled are currently being disposed, resulting in lost economic and environmental protection benefits. This practice is not sustainable in the long run, and so stronger actions are needed to ensure recovery of recyclable materials. The goal of our recycling efforts must be to ensure that all waste is processed for the removal of recyclables prior to disposal. Key components of our strategy include:

- Use the Product Stewardship Initiative to increase the recyclability of products and packaging.
- Pursue legislation requiring that residents in multi-family units be provided with access to recycling.
- Work with the waste industry to increase the Commonwealth's recycling infrastructure through Recycling Benefits Plans.
- Enhance enforcement of waste bans.
- Promote Pay-As-You-Throw municipal trash programs.
- Continue to provide grants, incentives, and other assistance to municipalities for recycling programs.
- Increase efforts to expand sustainable markets for recyclables.
- Implement a statewide recycling education campaign to increase participation in recycling programs.
- Provide recycling education and technical assistance to businesses and the construction industry.
- Ban disposal of unprocessed C&D in 2003.
- Continue to support increases in Clean Environment Fund spending on recycling programs and work to eliminate provisions that limit spending flexibility.

Waste Disposal Capacity

Our capacity projections indicate that, even if we increase our waste reduction capacity to meet our milestones, we will still need to permit additional disposal capacity to meet our no net import / no net export goal. This disposal capacity is primarily replacement capacity needed due to the closing of unlined landfills and the closing of the Lawrence and Fall River combustors due to more stringent air emission limits. In permitting this capacity, we will continue to ensure the protection of health and the environment and promote an integrated approach to waste management that emphasizes waste reduction.

Key components to our capacity allocation and permitting strategy include:

- Accepting applications for landfill capacity that incorporate stricter facility safeguards, with a strong preference for residuals landfills that support comprehensive waste processing facilities.
- Requiring non-residual disposal facilities to implement Recycling Benefits Plans that lead them to take aggressive actions to increase source reduction, toxicity reduction, and recycling.
- Increasing waste ban enforcement to keep recyclable materials from being disposed.
- Enhancing protection of public health and the environment from solid waste facilities by:
  - Issuing final revised solid waste facility siting criteria that provide increased protection for sensitive receptors and resources, including evaluation of cumulative impacts associated with new or expanded solid waste facilities.
  - Revising solid waste permit regulations to include evaluation of cumulative impacts associated with the expansion of solid waste facilities within site assigned areas.

- Revising the landfill design standards to require a double liner system with leak detection for all new disposal cells.

- Phasing in disposal capacity on a yearly schedule until 2006 consistent with our no net import / no net export goal.

Together, these actions will support our primary goal of increasing waste reduction to the maximum extent possible.

Non-MSW Waste Streams

Municipal solid waste (MSW) has historically been the primary focus of state and local planning efforts. However, the inter-relationship between the management of MSW and other non-municipal solid wastes (non-MSW) requires that we look holistically at our entire waste stream to ensure that our planning for specific waste streams takes into account effects on other waste streams. In particular, this *Plan* recognizes the important relationship between landfill capacity and the management of non-MSW materials (such as construction and demolition debris, contaminated soils, and dredge materials), and starts the process to better account for these materials and plan for their responsible management.

Chapter One: Introduction

Purpose and Implementation

The Department of Environmental Protection (DEP) has issued this *Beyond 2000 Solid Waste Master Plan – A Policy Framework* in accordance with Massachusetts General Laws, Chapter 16, §21, which requires DEP to develop and maintain a comprehensive statewide master plan for solid waste management. This *Plan* supersedes all previous Solid Waste Master Plans, Plan Updates and amendments.

This *Plan* provides a broad policy framework that lays out general strategies for managing solid waste in the Commonwealth for the next ten years and establishes milestones for measuring progress. On an annual basis, DEP will develop specific program plans and budgets for implementing the strategies outlined here, and will share these plans with the Solid Waste Advisory Committee, which advises DEP on solid waste issues. DEP recognizes that a broad-based coalition of environmentalists, municipalities, businesses, recycling advocates, and other stakeholders is needed to help guide implementation of the *Plan* over the next ten years. To promote active and balanced stakeholder participation, DEP will formalize the membership of the Solid Waste Advisory Committee. By formalizing this Committee, DEP will ensure that all interests are represented and have clear opportunities to be involved in advising DEP on implementing the *Plan*. DEP also will track progress in meeting waste reduction milestones and will report each year by early summer on progress achieved during the previous year. As needed, DEP will revise the policy framework in this *Plan* based on the performance of the solid waste management system and input from the Solid Waste Advisory Committee and other program stakeholders.

Vision

The vision we adopt in this *Plan* is one where we continually work to reduce the quantity and toxicity of our waste to the maximum extent possible, so that we dispose of the least amount of waste as possible.

To achieve this vision, we must place a greater emphasis than we have in the past on preventing waste in the first place. Source reduction is the most environmentally preferable and potentially least costly alternative to waste management. Wastes not generated in the first place do not need to be managed, and therefore the impacts and costs of waste management are avoided altogether. We must also get the toxics out of our waste stream by reducing the toxics in products and packaging and by providing for the collection of those hazardous products that are produced. Finally, we must continually increase the amount of materials that we recover from the waste stream so that only an irreducible minimum is sent for disposal.

Increasing our capacity to reduce waste is a wise investment that will greatly benefit the Commonwealth. Reducing waste generation and increasing recovery of useful materials will add to our economy and promote greater sustainability in our communities, conserve land and natural

resources, and result in the need for fewer landfills and combustion facilities with their potentially adverse impacts.

We recognize that while striving to achieve maximum waste reduction and minimum waste disposal, technological and economic barriers must be considered. However, with the commitment of the residents of the Commonwealth, municipalities, businesses, and the waste industry, we believe we can find creative and cost-effective ways to overcome these barriers in order to better protect quality of life and the environment.

We also recognize that, while working toward maximum waste reduction, we must take responsibility for managing waste that is not reduced or recycled. This can be done by providing, as a last resort, disposal capacity for these wastes in a manner that does not endanger public health or the environment and that provides incentives to reduce and recycle waste.

Background

In 1990, the Executive Office of Environmental Affairs (EOEA) and DEP published the *1990 Solid Waste Master Plan*, laying out a ten-year strategy for managing the Commonwealth's solid waste. The *1990 Plan* established an integrated waste management hierarchy favoring source reduction, followed by recycling, and then disposal as a last resort with a preference for waste-to-energy combustion over landfilling. It also set the following state-wide goals for how municipal solid waste (MSW) was to be managed by the year 2000:

- 10% is source reduced (this would keep the amount of MSW generated each year level despite growth in the economy and the population).
- For MSW that is generated:
  - ⇒ 46% is recycled.
  - ⇒ 50% is combusted with energy recovery,
  - ⇒ 4% is landfilled.
- The toxicity of waste is significantly reduced through the removal of household hazardous products prior to disposal.

Since 1988, the Commonwealth has maintained an overall solid waste disposal policy that limits disposal capacity to disposal need within the state (meaning that there should be no net import or net export of waste). This policy is designed to protect the environment from the adverse effects of solid waste disposal while at the same time recognizing that the state has a responsibility to manage the waste its citizens and businesses produce.

Under the *1990 Plan*, there were three comprehensive *Plan Updates* (1994, 1995, and 1997) and a 1999 Amendment to the *1997 Update*. These documents provided updated solid waste system information and laid out steps for implementing the policies and programs needed to achieve the goals set in 1990.

Figures 1-1 and 1-2 below show the annual amount of MSW and non-MSW (respectively) generated in Massachusetts from 1990 through 1999, and how it was managed. Solid waste accounted for includes MSW (typical trash from households and businesses), and non-MSW -

primarily construction and demolition debris, but also smaller amounts of sludge, non-hazardous industrial solid waste, and other wastes. In 1999, 50% of all waste generated was diverted from disposal to recycling.[1]

Figure 1-1: How MSW Was Managed 1990-1999

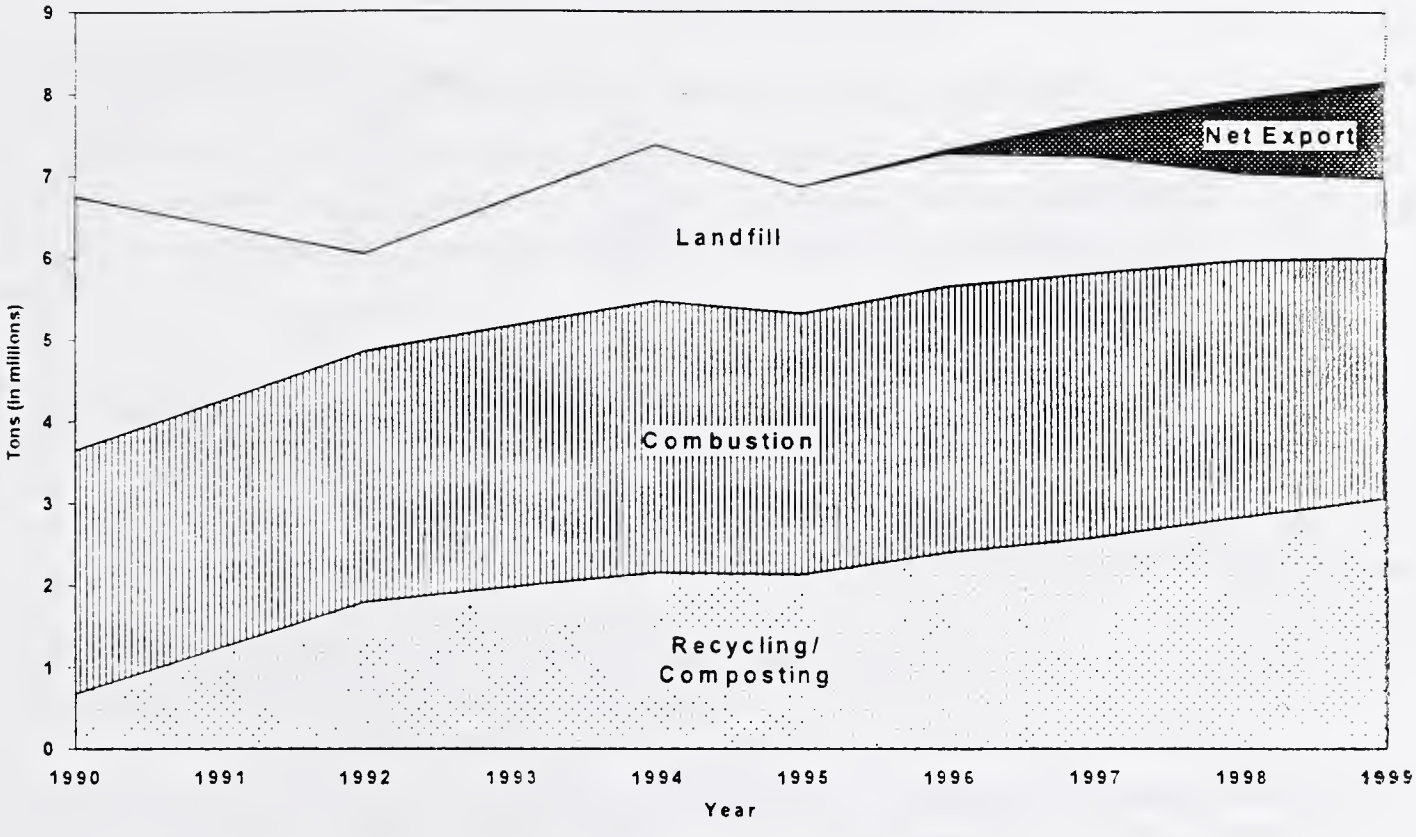
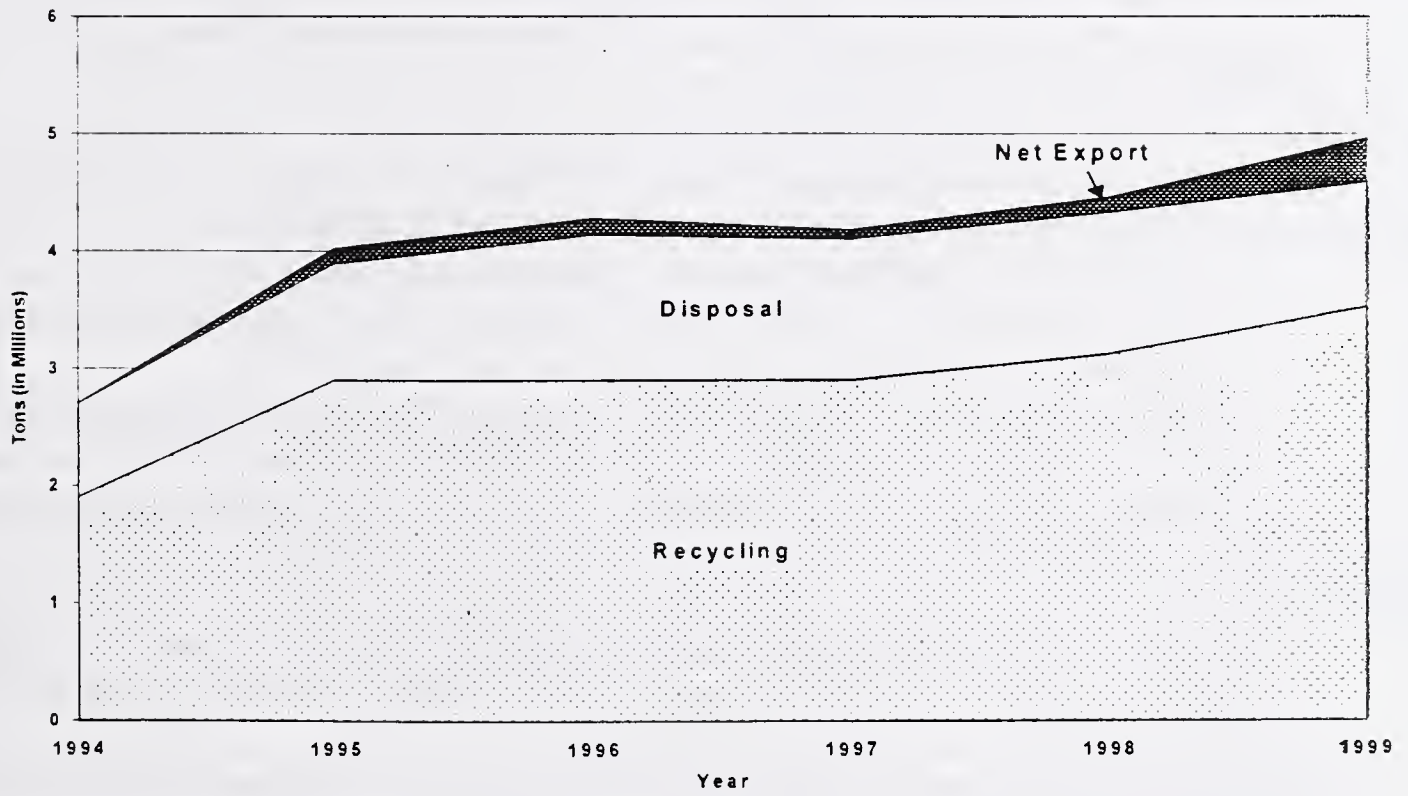


Figure 1-2: How Non-MSW Was Managed 1994-1999



[1] Includes estimates of backyard composting.

Massachusetts has clearly made tremendous progress in meeting the goals of the *1990 Master Plan*. However, due to the robust economy, the generation of waste has increased faster than expected, and while the amount of waste recycled has increased each year, it has not kept pace with increases in generation. As a result, Massachusetts no longer has enough in-state management capacity to handle its waste - net exports amounted to over 1.5 million tons of MSW in 1999, which represents 14% of MSW generated.

Table 1-1: Where are We Relative to the 2000 Goals?

	1990	1999	2000 Goals
Recycled	10%	38%	46%
Combusted	44%	36%	50%
Landfilled	46%	12%	4%
Net Import (-) / Export (+)	*	14%(+)	0%

Note: Recycled includes estimates of backyard composting.
* Data not available. Between 1990 and 1994, Massachusetts was an overall net importer of solid waste. Massachusetts has been a net exporter of solid waste since 1995.

The Importance of Waste Reduction

The primary policy underpinning of this *Plan* is that Massachusetts should minimize disposal by reducing the quantity and toxicity of waste generated. There are many benefits to our quality of life that result from waste reduction. Increased waste reduction results in less waste disposal, which means the need for fewer landfills and combustion facilities with their potentially adverse impacts. Manufacturing with recycled materials is far less costly to the environment in natural resource and energy consumption. Recycling also creates jobs and conserves natural resources. Recycling avoids the true costs of treating recyclables as waste to be landfilled, which may average in the range of $150-$330/ton.[2] To illustrate just some of these benefits, the MSW diverted from disposal in Massachusetts in 1999 is estimated[3] to have:

- reduced greenhouse gas emissions by 700,000 tons of carbon equivalent per year, equal to 13% of all industrial carbon dioxide emissions in Massachusetts;
- saved 22.5 trillion BTUs of energy, enough to power nearly 120,000 homes for a year;
- reduced air pollutants by more than 87,000 tons and water pollutants by more than 9,000 tons (in addition to the greenhouse gas emissions mentioned above);
- reduced emissions of nitrogen oxides by about 8,500 tons and reduced emissions of sulfur oxides, an important ingredient in acid rain formation, by about 6,200 tons; and
- reduced the need to mine 540,000 tons of iron ore, nearly 300,000 tons of coal, and 26,000 tons of limestone.

In addition, recycling has added to the Commonwealth's economic health. It is estimated[4] that the recycling, reuse, and remanufacturing industry in Massachusetts directly employs more than

[2] *Recycle 2000: Recommendations for Increasing Recycling in the Commonwealth of Massachusetts*, EOEA, February 1999.
[3] Source: "Estimating the Environmental Impacts of Recycling: A Spreadsheet Estimation Model", Northeast Recycling Council, August 1999.
[4] *Recycling Economic Information Study*, Northeast Recycling Council, June 2000.

19,000 people, and the more than 1,400 companies that employ them generate estimated annual receipts of over $3.5 billion. These activities create indirect effects by employing firms that support activities of these businesses. Together, indirect and induced effects from recycling businesses support over 21,000 additional jobs. In total, direct and indirect economic activity from recycling businesses generates more than $142 million in revenues for the Commonwealth.

Environmental Justice

Massachusetts is working proactively to ensure that every resident of the Commonwealth has equal access to sound environmental policy decisions and that no sector of the population bears a disproportionate environmental burden, regardless of race, color, national origin, culture, or income.

The Executive Office of Environmental Affairs (EOEA) has created an Environmental Justice Program and hired full-time staff to develop policy tools for addressing environmental justice issues in the Commonwealth and ensuring fair and equitable implementation of Massachusetts' environmental programs. Through its Environmental Justice Program, EOEA is forging ties with community groups and residents who are working on environmental justice issues in their local communities. One goal is to develop a framework within which the Commonwealth can address environmental justice and public health issues on a broad and comprehensive basis and foster sustainability that is based on community priorities.

In implementing this *Plan*, DEP will work to ensure that the principles established in EOEA's environmental justice policy are upheld, and will actively promote the mandates of Title VI of the Federal Civil Rights Act of 1964 in the siting and permitting of solid waste facilities, as well as other types of facilities.

DEP will shortly publish final revisions to the solid waste facility site assignment regulations which will include several criteria that will further protect the interests of those who live near a proposed solid waste facility, including notification to communities with significant minority populations in their primary language, increased setbacks to provide larger buffers between the facilities and nearby residents, and evaluation of cumulative impacts associated with new or expanded solid waste facilities.

Key Challenges

Solid waste management has changed in significant ways since the publication of the *1990 Master Plan*, and new conditions present new challenges to achieving our vision of reducing the quantity and toxicity of our waste to the maximum extent possible. Key challenges that we face include:

Increasing waste generation – Massachusetts and the nation as a whole have experienced a prolonged period of economic expansion. A good economy means growth in per capita waste generation due to increased purchasing of goods. Total waste generation in Massachusetts increased 6% from 1998 to 1999. While major source reduction and recycling efforts have

diverted significant quantities of waste from disposal, the amount of waste requiring disposal has continued to increase.

Slower growth in recycling – For the past five years, the recycling rate in Massachusetts has increased only 1% to 2% each year. Many states, including Massachusetts, have found that they are not likely to meet their ambitious Year 2000 recycling goals. The fact that citizens, municipalities, and many businesses have embraced recycling as a way to protect the environment has resulted in tremendous gains. However, much of the easier initial gains have been made and further recycling increases are becoming more difficult, requiring a renewed and concerted effort by the public, government, business, and the waste industry to push recycling higher.

Resistance to change – Our vision of maximum waste reduction calls for significant changes in the behavior of the public and private sectors and even changes in how goods are produced. The social and economic changes needed for achieving this vision are not easy to make, and will require strong partnerships between the public and private sectors. Residents, businesses, institutions, and government must take increased responsibility for reducing, reusing, and recycling waste. The waste industry must fully embrace waste reduction as its core business, ensuring that all recyclables are recovered and only the smallest amount of waste is disposed. Manufacturers also must change their role by taking more responsibility for the products they produce so that they contain less toxics, create less waste, and are easier to reuse and recycle.

New products with toxics – Each year, new products enter the marketplace that contain toxic materials, posing new waste management challenges. Through the Product Stewardship Initiative, our goal is to become proactive in addressing toxics by working with product designers and manufacturers rather than simply reacting to new products with toxics.

Growing concerns about cumulative exposures and health effects - Increasingly, citizens and local officials are asking environmental officials about cumulative exposure to pollutants from multiple waste management facilities and other sources, and the resulting health effects. These are new and challenging questions that face environmental agencies across the nation. Only a few of these agencies are beginning to grapple with the complex issue of "cumulative impact assessment." The science of such assessments is in its infancy and the tools and knowledge are just being developed to address this important area. DEP is already taking steps to begin to address cumulative impacts through changes to the solid waste facility siting regulations and permitting regulations. In addition, as it becomes available, DEP will continue to review new scientific information on the potential risks from all waste management facilities (e.g., the U.S. Environmental Protection Agency's Dioxin Reassessment Study) and work to update standards as appropriate to ensure adequate protection of public health and the environment.

Difficulty in siting solid waste facilities – Siting any type of solid waste handling facility in Massachusetts is becoming increasingly difficult. The siting process for disposal capacity is costly and controversial, raising questions about whether there will be enough additional management capacity to meet state needs. Our strategy is to increase waste reduction to lower the need for disposal sites. To do this, additional organics and C&D processing / transfer facilities will be needed, which have their own siting challenges.

Effect of decreasing landfill capacity on the management of non-MSW materials – C&D is the primary component in the non-MSW waste stream and has been accounted for in past planning efforts. However, there are a number of other non-MSW waste streams and materials in Massachusetts that have not been fully accounted for but which rely heavily on landfills for their management. For example, the majority of oil and other slightly contaminated soils removed through cleanups governed by the state's Waste Site Cleanup Program go to landfills as alternative daily cover, grading and shaping materials, or engineered capping material. C&D fines, which are a residual byproduct of C&D recycling, are also dependent on use at landfills as daily cover. As the number of landfills diminish, outlets for these materials are becoming scarcer. The reduction of cost-effective management options could adversely affect cleanups, brownfield developments, and C&D recycling, which are activities the Commonwealth seeks to promote.

Chapter Two: Waste Reduction Strategy

Our vision to reduce the quantity and toxicity of our waste to the maximum extent possible calls for a strong waste reduction strategy. The three key components of this strategy are source reduction, toxicity reduction, and recycling.

First, we must place a greater emphasis than we have in the past on preventing waste from being generated. Source reduction is the most environmentally preferable and potentially least costly alternative to waste management. Wastes not generated in the first place do not need to be managed, and therefore the costs and impacts of waste management are avoided altogether.

Second, we must ensure that products contain fewer toxics and that those which do contain toxics are removed from the waste stream for recycling or proper disposal. Many of the products that people routinely throw in the trash contain some toxics. A small amount of toxic material can go a long way in contaminating the environment. Toxicity reduction greatly improves our ability to manage wastes that are generated in an environmentally safe manner.

Finally, we must continue to increase the recycling of useful materials. Many materials that can be recycled are currently being disposed, resulting in lost economic and environmental protection benefits. This practice is not sustainable in the long run, and so stronger actions are needed to ensure recovery of recyclable materials. The goal of our recycling efforts must be to ensure that all waste is processed for the removal of recyclables prior to disposal.

To measure progress for implementing our waste reduction strategy, we have set new milestones. By 2010:

- Achieve 70% waste reduction of municipal solid waste and construction and demolition debris (60% MSW waste reduction and 88% C&D waste reduction).

- Substantially reduce the use and toxicity of hazardous products and provide convenient hazardous product collection services to all residents and very small quantity hazardous waste generators.

Our waste reduction strategy will include a number of new initiatives as well as continuation of existing programs. Two key initiatives that are closely tied to the role solid waste facilities will play are Recycling Benefits Plans and enhanced waste ban enforcement. These initiatives are described in Chapter 5 in our permitting strategy. The other components of our waste reduction strategy are described below.

Product Stewardship Initiative

The task of reducing waste is a big one. But if we address the issues we face together, we will find new and innovative ways to meet our goals to reduce the toxicity and amount of waste, and to increase recycling. One major way we will meet the challenge before us is by launching a new Product Stewardship Initiative with manufacturers to encourage and, in some cases, require them to share in the responsibility for managing the products they produce. These efforts, being

led by the Executive Office of Environmental Affairs (EOEA), will contribute to each of the components of our waste reduction strategy, including source reduction, toxicity reduction, and recycling.

Product Stewardship refers to the concept that all parties responsible for the design, production, sale, and use of a product assume responsibility for the full environmental impacts of the product throughout its life cycle.[1] Environmental impacts of products considered include air and water pollution, energy and materials consumption, the amount of toxics in products, product and packaging waste, and worker and consumer safety. Solutions to reduce these impacts require the cooperation of product designers and manufacturers, suppliers and distributors, retailers, and consumers. The following are all examples of product stewardship actions that can be taken by government and industry to reduce product impacts: reducing the amount of plastic in a soda bottle; substituting a non-toxic for a toxic material in a bathroom cleaner; setting up a collection program to take back carpet, paint, or electronics for recycling.

A key tenet of Product Stewardship is that manufacturers in particular should take greater responsibility for reducing product impacts. By placing greater responsibility for the end costs of products on manufacturers, product stewardship gives manufacturers strong economic incentives to change how they design and manufacture products, making them less toxic and more recyclable, and giving consumers more choice by internalizing the costs of consumer products.

Product Stewardship also addresses the question of who should pay the cost of waste management, including recycling, disposal, and removing toxics from the waste stream. Currently, these costs are being borne almost entirely by local governments, who have looked to state agencies for financial assistance. State agencies are now looking to product manufacturers to become part of the solution by helping to pay the costs created by the proliferation of waste that local governments must manage.

Product Stewardship efforts have already begun in Massachusetts. EOEA has worked with the rechargeable battery industry to start a battery recycling program, developed used oil recycling legislation with the petroleum industry, and is currently involved in a surplus paint take-back program with Benjamin Moore, which has a Massachusetts manufacturing location. Other local manufacturers have also expressed an interest in working to develop joint solutions to waste problems.

EOEA's Product Stewardship Initiative will explore with selected manufacturers ways to share in the management of products all along the product's life cycle. While this effort primarily will be voluntary in nature, it will be backed by the potential for government regulation, especially on issues of major importance. For example, DEP has issued municipal waste combustor regulations that require facility owners to assist the state in developing programs to collect and recycle or dispose of products containing mercury prior to combustion. EOEA has also supported state legislation that would require manufacturers to share responsibility with the state, the combustion industry, and other stakeholders in ensuring that mercury-containing products, such as button batteries, thermostats, thermometers, electrical switches, and fluorescent lamps, are not thrown in the garbage.

[1] Solid Waste Policy Report, Minnesota Office of Environmental Assistance, January 2000, p. 45.

EOEA is taking a lead role working with other states to develop a national consensus on the product stewardship roles to be played by government and industry. Massachusetts has joined with Minnesota, California, and other states to explore creative ways to reduce product impacts. and to finance the systems needed to protect public health and the environment. EOEA hosted a national Product Stewardship Forum in December 2000 that discussed strategies for negotiating with industry to address the increasing complexity of waste management and the significant costs faced by local and state government. Emphasis was placed on five priority products: electronics, paint, carpet, products containing mercury, and pesticides.

In addition, EOEA and the University of Massachusetts are jointly supporting the creation of a new national Product Stewardship Institute based at the University of Massachusetts at Lowell. This national Institute will assist Massachusetts and other states across the country in promoting environmentally sound product management and design, and support negotiations with industry to reach cooperative agreements to reduce the health and environmental impacts from consumer product manufacture, use, storage, and disposal. At times when legislation is required to foster the goals of product stewardship, the Institute will assist state agencies and legislative bodies on developing legislation.

The next steps of EOEA's Product Stewardship Initiative include developing a Massachusetts Product Stewardship Policy; continuing work on Product Stewardship Action Plans for priority products, developing a research agenda, and supporting regional and national product stewardship initiatives through the national Product Stewardship Institute. As part of these efforts, EOEA will evaluate industry willingness to enter into and follow through on agreements, and will consider additional agency efforts, including regulatory requirements, if significant progress is not shown by industry.

Source Reduction Strategy

The most environmentally preferable strategy for reducing waste disposal is to prevent waste from being produced in the first place. Source reduction prevents the consumption of natural resources and reduces the burden on the recycling and waste disposal infrastructure. Source reduction refers to the design, manufacture, purchase, or use of materials to reduce the quantity generated and/or the toxicity of materials before they enter the solid waste management system. This includes redesigning products or packaging to reduce the quantity or the toxicity of materials used, reusing products or packaging already manufactured (including remanufacturing), and lengthening the life of products to postpone disposal. While source reduction refers to both volume *and* toxicity reduction of solid waste, this section focuses primarily on volume reduction (see the next section for Toxicity Reduction.)

Communities and businesses throughout the country are already implementing source reduction programs, many of which have contributed significantly to solid waste management efforts. Prominent examples in the residential sector include grass-cycling (i.e., leaving grass clippings on lawns), home composting of food and yard waste, and clothing reuse. In the commercial sector, examples include newspaper light-weighting (i.e., using less material), packaging redesign, pallet reuse, and electronic document storage.

Over the past 10 years, major state and municipal programs contributing to source reduction in Massachusetts have included programs promoting backyard composting, adoption of Pay-As-You-Throw (PAYT) programs, household hazardous product collection, electronics collection and reuse, technical assistance to help businesses reduce their waste generation, product stewardship efforts (e.g., manufacturer rechargeable battery take back), and the use of state procurement specifications that promote reuse and waste/toxicity reduction.

Source Reduction Goals and Objectives

The goal of our source reduction strategy is to reduce the environmental and public health impacts that arise from the extraction, manufacture, distribution, use and disposal of materials. Specific objectives include:

- Increase source reduction[2] to support our 60% MSW and 88% C&D waste reduction milestones.
- Promote source reduction education and awareness among businesses, government, and consumers.
- Decrease the toxicity of materials entering the waste stream (see the next section on Toxicity Reduction).
- Develop the capacity to better measure, evaluate, and communicate progress in source reduction.

Source Reduction Programs

Key programs in our source reduction strategy include:

- Implement EOEA's Product Stewardship Initiative.
  - Work with manufacturers to promote less packaging in products and more reuse opportunities.
  - Support voluntary agreements and actions promoting product take-back, reuse and waste reduction.
  - Support state, regional and national product stewardship initiatives.

- Promote C&D reuse and source reduction.
  - Create a source reduction guide for contractors.
  - Sponsor waste prevention training for residential and commercial building contractors.
  - Integrate source reduction strategies into state government building designs/ specifications.
  - Expand existing efforts to promote exchange of building materials between contractors and homeowners.
  - Revise beneficial use determination regulations to facilitate reuse of C&D materials.
  - Encourage municipalities to reduce building permit fees or provide other incentives for contractors that implement reuse strategies.
  - Promote source reduction concepts in building design.

[2] Source reduction amounts can be counted as the difference between potential waste generation and actual waste generation. See Chapter 3 for a more detailed explanation.

- ❑ Seek to incorporate source reduction into projects undergoing Massachusetts Environmental Policy Act (MEPA) review.

- Promote Pay-As-You-Throw (PAYT) programs throughout the state.
  - ❑ Provide financial incentives for municipalities who start PAYT programs.
  - ❑ Expand workshops and outreach materials on PAYT.

- Expand on-site composting programs for yard, paper and food waste.
  - ❑ Conduct a statewide public education campaign targeting organic wastes.
  - ❑ Promote rebate programs with manufacturers and distributors of mulching lawn mowers.
  - ❑ Promote food banks as a way to keep surplus food out of the waste stream.
  - ❑ Conduct intensive compost bin distribution and education programs for composting in PAYT and other communities.
  - ❑ Promote environmentally preferable landscaping strategies (such as use of native species) to reduce organic by-products.
  - ❑ Provide consumer education grants to municipalities.

- Promote material exchanges and reuse networks targeting building materials, industrial waste, household materials and electronic equipment.
  - ❑ Provide technical assistance, including training and networking.
  - ❑ Provide equipment grants to reuse organizations (for trucks, facilities, computers).
  - ❑ Develop an inventory of reuse organizations and services for dissemination via the DEP web site and other means.
  - ❑ Conduct pilot projects to identify best outreach and transportation practices.
  - ❑ Provide consumer education grants to municipalities.

- Conduct a multi-sector paper reduction campaign (targeting the production of fewer catalogs, phone books, junk mail, and office paper).
  - ❑ Conduct municipal pilot programs targeting catalogs, junk mail, and phone book reduction.
  - ❑ Work with regional and national organizations to develop agreements with direct mail companies to reduce mailing weight and frequency, use recycled paper, and replace paper catalogs with online catalogs.
  - ❑ Promote the development and use of innovative technologies to enable electronic document storage and transmission as alternatives to paper.
  - ❑ Develop a pilot project to obtain a 25% reduction in the use of paper at DEP and other EOEA agencies.
  - ❑ Promote paper waste reduction initiatives in key sectors (e.g., financial, insurance, legal), through technical assistance and performance recognition.

- Enhance business source reduction technical assistance and policies.
  - ❑ Encourage source reduction through the Environmental Stewardship Program currently being developed by EOEA, which will encourage companies to not only reduce the use of toxic chemicals, but also reduce energy and water consumption and solid waste.
  - ❑ Support waste audit programs that integrate solid waste source reduction with energy and water efficiency programs.
  - ❑ Sponsor waste reduction awards and contests.

- ❑ Integrate source reduction initiatives into other business assistance programs conducted by agencies, organizations or utilities.
- ❑ Support industrial waste exchange programs and eco-industrial parks.

- Conduct source reduction education programs that focus on consumer purchasing practices, backyard composting, and reuse opportunities.
  - ❑ Provide municipal education grants to support smart purchasing campaigns.
  - ❑ Develop an interactive web site with source reduction ideas and reuse opportunities for communities.
  - ❑ Develop partnerships with agencies, utilities, and businesses to incorporate source reduction concepts in their promotional materials.

- Promote state procurement specifications that facilitate source reduction, including leasing and take-back strategies, use of remanufactured products, lightweighting, packaging elimination, bulk packaging, and longer warranties.

Toxicity Reduction Strategy

Many of the products that people routinely throw in the trash contain some toxics, such as mercury, lead, organic solvents and cadmium. They end up in a landfill or incinerator, where, even with increasingly stringent pollution controls, toxic chemicals and metals may leach into groundwater or escape into the air. Nationwide, consumers are growing more aware of the environmental and health consequences of using and disposing of hazardous products that are routinely generated at home or at businesses. A small amount of toxic material can go a long way towards contaminating the environment. Therefore, it is important to ensure that products contain fewer toxics, and that those products that do contain toxics are removed from the waste stream.

Over the past decade, the state has focused on reducing the toxicity of waste by removing hazardous household products prior to disposal. While continuing these efforts, our strategy must focus more on decreasing the production and purchase of products containing toxics, which is the most effective way to reduce toxicity in the waste stream.

Massachusetts programs to reduce the toxicity of the waste stream have served as a model around the country for their cost-effective approach and their focus on priority materials. In 1996, EOEA, in conjunction with DEP and the Office of Technical Assistance, issued the *Massachusetts Plan for Managing Hazardous Materials from Households and Small Businesses* (The HHP Plan). This document presented a framework for household hazardous products (HHP) management focusing on the overall goals of protecting human health and the environment by reducing the toxicity of the waste stream and conserving valuable resources in leftover HHPs. This was to be accomplished mainly by collection of materials at the local level through a phased approach.

The HHP Plan grouped materials into three categories: high volume materials (such as paints and automotive products), Universal Wastes[3], and low volume materials (such as solvent-based glues, photographic chemicals, etc.). This framework has guided the state's efforts to promote permanent local HHP collection programs that increase access to HHP collection services for the high volume and Universal Waste materials which were often not included in past collection initiatives.

Under the HHP Plan, DEP has supplied 85 used motor oil collection tanks, as well as wooden sheds and flammable material cabinets for surplus paint collection programs in over 80 locations throughout the state. Over the past few years, DEP has provided technical assistance and funding to communities setting up innovative HHP programs, such as mercury-bearing waste collections. In FY98, DEP gave a $164,000 grant to an eight-community regional group to establish a permanent HHP collection facility based in Lexington that also takes low volume materials. In addition, DEP added sheds for the collection of mercury-bearing waste to the grant program in FY99.

Much progress has been made in implementing the HHP Plan, particularly for the collection of paint, oil and universal wastes. Building on this foundation and the experience gained in recent years, DEP plans to enhance efforts to increase access to comprehensive HHP collection services (including low volume materials) for residents and for very small quantity generators (VSQGs) of hazardous wastes.[4] VSQGs may include municipal and state agencies, schools, public works departments, and small businesses that have universal wastes and small amounts of waste chemicals, but have typically not been served by municipal collection programs.

Table 2-1: Categorization of Hazardous Product Materials

Category	Product	Examples of Hazardous Components
High Volume Materials	Paints, rust remover, furniture strippers, motor oil, oil filters, anti-freeze, automotive batteries, household batteries, disinfectants	Acetone, xylene, toluene, ethylene glycol, lead, benzene, petroleum distillates, glycol ether
Universal Waste Materials	Button cell and nickel-cadmium batteries, mercury thermostats, pesticides, fluorescent lamps	Sulfuric acid, lead, cadmium, mercury, organo phosphates, malathion, carbal, anilazine
Low volume materials	solvent-based glues, photographic chemicals, aerosol spray cleaners, pool chemicals, lime fertilizer	Acrylamide, acrylic acid, chlorobenzene, perc, aniline, munatic acid, calcium oxide

Source: *Massachusetts Plan for Managing Hazardous Materials from Households and Small Businesses*, Mass. EOEA, 1996, and the Massachusetts Water Resources Authority.

[3] The U.S. Environmental Protection Agency, in its Universal Waste Rule (URule) of May 1995, reduced the management requirements for certain "universal" wastes previously subject to full hazardous waste requirements so that better environmental protection could be achieved at lower cost. The items include batteries (primarily nickel cadmium and button batteries), thermostats, fluorescent lamps, and pesticides.

[4] A VSQG is a non-household entity that produces less than 100 kilograms (220 lbs. or approximately 27 gallons) of hazardous waste per month.

Many communities have HHP collection events every year. However, one quarter of the communities in the state have not conducted a collection event in over six years. Residents of communities that offer annual HHP events do not necessarily have access to collection services when they need them (e.g., when residents are moving or doing spring or fall cleaning). DEP receives phone calls on a regular basis from citizens looking for a safe place to dispose of their hazardous products. In fact, there is an increasing problem of abandoned hazardous products at public works yards and recycling centers. DEP plans to address this need through increased initiatives aimed at toxicity reduction throughout the state and by expanding the current focus to include general "hazardous products" encompassing those generated by small businesses as well as by households.

Toxicity Reduction Goals and Objectives

The goal of our toxicity reduction strategy is to reduce the environmental and public health impacts from exposure to hazardous products used by and generated as waste by households and small businesses. Specific objectives include:

- Through EOEA's Product Stewardship Initiative, reduce toxics in products and ensure proper post-consumer collection and recycling / reuse.
- Expand access to *all* Massachusetts residents and very small quantity generators (VSQGs) to convenient, comprehensive, cost-effective hazardous product collection programs by 2010.
- Establish sixteen permanent hazardous product collection centers, four in each of the four DEP regions, by the year 2005.
- Double the year 2000 participation rate in hazardous product programs by 2005.
- Implement the toxicity reduction elements of the Massachusetts Zero Mercury Strategy (e.g., reducing mercury in hospitals, establishing mercury-bearing products collection, pursuing mercury labeling and take back legislation).
- Increase participation in mercury waste collection programs to 50% of all municipalities by the end of 2003.
- Reduce mercury received at combustion facilities through source separation efforts by 50% by the end of 2003 over baseline inlet tests conducted in 1999.
- Reduce the use of hazardous products through responsible purchasing and alternative practices and products.
- Raise awareness of the impacts of hazardous products on the environment and public health.
- Pursue key toxics reduction legislation (e.g., toxics in consumer products, mercury labeling and take-back legislation, used oil recycling reforms, Environmental Stewardship Initiative).

Toxicity Reduction Programs

Key programs in our toxicity reduction strategy include:

- Promote the use of environmentally preferable products (EPP) and encourage product stewardship by:
  - Implementing EOEA's Product Stewardship Initiative for reducing the use of toxic materials in products and manufacturing.

- Developing criteria and methodologies for evaluating environmental attributes of various consumer and commercial products, including cleaners.
- Evaluating opportunities to develop partnerships with retailers and manufacturers of EPP alternatives to hazardous products.
- Pursuing legislation that advances the use of EPPs (e.g., toxics in consumer products).

- Establish cost-effective regional programs that will provide for collection of hazardous products at least 3 times per year at no greater than 30 minute driving distances, through:
  - Stand-alone local and regional facilities.
  - Collection centers at waste water treatment plants.
  - State university consolidation centers.
  - Mobile collection units.
  - Reciprocal agreements among regional groups for participation in hazardous product events.

- Promote regional coordination, local capacity building, and technical assistance including:
  - Regional networks to assist municipalities with program development.
  - Public/private partnerships.
  - State contracts to assist with needed procurement of goods (e.g., recycled paint for municipal or state use) and services (e.g., collection for municipalities).

- Provide equipment grants and services by:
  - Continuing to offer collection equipment through the Recycling Grant Program for the establishment of permanent local and regional collection centers.
  - Providing subsidies to municipalities to offset costs for recycling or disposing of target materials, such as CRTs and mercury-bearing wastes, while seeking greater industry financing through the Product Stewardship Initiative.

- Develop and implement training programs on proper management of hazardous products, best management practices, and health and safety issues for:
  - Municipal officials (departments of public works and schools).
  - Hazardous products collection center managers.
  - Building maintenance personnel.
  - The medical industry.

- Implement education and outreach programs by:
  - Promoting participation among residents, municipal and state agencies and small business groups in collection programs.
  - Developing outreach materials on best management practices for targeted generator groups, such as the health care industry.
  - Creating outreach and communication strategies to encourage individual consumers and small business purchasers to procure environmentally preferable products.

Recycling Strategy

Since 1990, Massachusetts has promoted a myriad of recycling and composting initiatives. Recycling and composting play an important role in managing the trash generated in homes and

businesses by reducing the need for additional disposal capacity at landfills and waste combustors. Far more than a local waste management strategy, recycling is an important way of reducing environmental impacts. Recycling of materials reduces the need for virgin resources extracted from forests and mines, saves energy, and reduces emissions of greenhouse gases and other dangerous air and water pollutants. Recycling also adds to the economy through the establishment of recycling-based businesses.

During the past ten years, recycling and composting programs operating throughout the state have resulted in a substantial amount of waste diversion. The recycling and composting rate in 1999 was 38%[5], up from 10% in 1990. Today, 85% of Massachusetts residents have access to recycling programs - up from 10% of the population in 1990 - and 78% have access to curbside collection of recyclables. Over 150 new curbside recycling programs have been established in Massachusetts since 1990, serving 4.7 million residents.

A recent study initiated by EOEA of the cost-effectiveness of Massachusetts recycling and composting programs shows that 70% of municipalities have cost-effective recycling programs serving 70% of the state's 6 million residents. It also shows that 93% of communities have cost-effective composting programs. These results confirm that for most Massachusetts municipalities recycling saves money.

The rate of recycling progress can be seen in Table 2-2 by the number of Massachusetts municipalities (out of a total of 351) which have increased recycling rates over time.

Table 2-2: Municipal Recycling Rates

Municipalities Achieving...	FY95	FY96	FY97	FY98	FY99
> 30%	124	150	181	181	182
20-29%	106	114	86	90	82
10-19%	79	60	53	46	43
5-9%	19	15	12	11	13
< 5%					
Not included due to incomplete data	23	12	19	23	31

These increases reflect the following recycling program successes:

- 277 municipalities have obtained Department Approved Recycling Program (DARP) status, which means that they have met minimum criteria demonstrating their commitment to recycling and composting.

- 225 municipalities have started home composting bin distribution programs, and 186 municipalities operate centralized leaf and yard waste composting sites (this has resulted in the achievement of a 95% composting rate in the residential sector).

[5] Includes estimates of backyard composting; without backyard composting the rate was 31%.

- 247 municipalities have participated in the Municipal Recycling Incentive Program (MRIP), which provides performance-based grants to municipalities which demonstrate an increasing commitment to recycling over time. These municipalities received $4.5 million in direct payments for tons recycled. As a result of MRIP criteria, over 100,000 additional households (primarily multi-family dwellings) will receive recycling services in 2000.

- 93 municipalities have adopted Pay-As-You-Throw (PAYT) programs in which residents pay more to dispose more, providing an economic incentive to greater recycling and source reduction.

- DEP has awarded $17.5 million in recycling grants to a total of 331 municipalities. These grants helped establish PAYT programs, 158 curbside recycling collection programs, 49 of the now-existing 195 waste oil collection programs (serving 70% of the state population), 84 paint collection programs (serving 39% of the population), and 67 mercury-bearing products collection programs. Grants also helped to distribute 69,000 backyard compost bins.

- Through regulation DEP has banned the disposal of a number of recyclable materials, including leaves and yard waste; lead-acid batteries; whole tires at landfills; white goods (e.g., large appliances); paper and cardboard; metal, glass, and plastic containers; and cathode-ray tubes (e.g., from televisions and computer screens).

- 295 municipalities have adopted buy recycled policies, largely as a result of grant and MRIP criteria.

- Since 1996, the Recycling Loan Fund has provided 16 loans totaling $2.5 million, leveraging approximately $8.7 million in private and public investments. This includes investments in recycling processors and manufacturers which use the following recyclable materials: clothing, construction and demolition debris, paper, scrap metal, tires, and wood. Loan funds have been used for the purchase of equipment and real estate and for working capital.

- In its first year, the Recycling Industries Reimbursement Credit (RIRC) grant program provided eight recycling processing and manufacturing companies with $330,000 in grants, leveraging over $750,000 in private investments and resulting in the processing of 70,000 tons of recyclable materials.

- The state spent $42 million in 1999 on recycled products, up from $2.8 million in 1992, and has made available or required in state contracts hundreds of recycled products, ranging from paper to motor oil, carpeting, and plastic park benches.

- MassHighway, in coordination with DEP, recycled 490,000 tons of waste in 1997 and 1998, reaching recycling rates of 96% and 94%, respectively.

- The state Operational Services Division's (OSD) environmental procurement program currently has two dedicated staff who help integrate environmental issues into a wide variety of state contracts, including environmentally preferable products and services. OSD prefers venders who offer the use of environmentally-friendly pest management services, hazardous material collection, energy efficient office equipment, and product take-back services. These

staff also conduct education and outreach efforts to purchasers at state agencies and municipalities, schools and other public entities, and hold an annual buy recycled vendor fa which attracts over 500 purchasing agents and 100 vendors every year.

Massachusetts Recycle 2000 Task Force Recommendations

EOEA assembled a Task Force to study the state of recycling in Massachusetts and to recommend strategies to reinvigorate recycling to meet the *1990 Master Plan* goals. The Task Force issued its final report in February 1999, which included the following core recommendations:

- better enforce existing waste disposal bans,
- expand recycling processing capacity,
- require recycling plans for commercial and multi-family buildings,
- provide stronger incentives (and requirements) for variable rate (or PAYT) programs,
- develop a strong statewide uniform education message and outreach assistance.

DEP has already begun to act on some of these recommendations and has incorporated others into this *Plan* (for example, adding transfer stations to facilities subject to the waste bans and increasing waste ban enforcement, planning a statewide recycling education campaign, and filin multi-family recycling access legislation).

Recycling Goals and Objectives

Over the past ten years, recycling has greatly reduced the need for disposal capacity and allowe the state to further its goal of closing unlined landfills. While significant recycling progress has been made and the citizens of the Commonwealth have embraced recycling as a way to protect the environment, increasing our recycling rate further will require a concerted effort by government, citizens, municipalities, businesses, and the waste industry.

In keeping with our commitment to reduce our reliance on disposal of waste in landfills and combustors, recycling must be improved and expanded. This means building on our existing programs and implementing new initiatives that will augment recycling rates throughout the state.

Specific objectives of the recycling strategy are:

- Encourage increased design for recycling through EOEA's Product Stewardship Initiative.
- Increase recycling to support our 60% MSW waste reduction milestone.
- Increase C&D recycling to support our 88% C&D waste reduction milestone.
- Increase recycling access to residents currently being served by private haulers (apartments, condominiums, single family residences, etc.) or those in municipalities without comprehensive recycling service.
- Increase participation in recycling by businesses.
- Promote greater participation in recycling programs through education, establishment of PAYT programs, etc.

- Expand markets for materials collected and the products manufactured from recycled materials.

Recycling Programs

Our recycling strategy for the next ten years will continue to focus on increasing access and participation in recycling programs and expanding recycling markets.

Increasing Access and Participation

Our recycling efforts will focus on increasing access to recycling services for those currently not served (e.g., commercial businesses, multi-family residences, and single-family residences served by private/subscription haulers) and on increasing participation in existing and new programs. Over one million residents in the state currently do not have access to recycling. A number of the largest cities in Massachusetts do not offer full recycling services. Surveys have shown that the average participation rate for residents in recycling programs is 45% and is lowest in urban areas and larger cities. The average recycling rate in the 50 largest Massachusetts municipalities is 23%, compared to a 29% rate in the smaller cities of the Commonwealth. Increasing participation in existing programs can have a dramatic effect on the state's recycling rate.

Key programs in our recycling strategy include:

- Continue to enhance enforcement of recycling regulations and promote multi-family recycling legislation.
  - Promote enactment of legislation filed by DEP requiring that residents in multi-family units be provided with access to recycling.
  - Enhance enforcement of the waste bans (further described in Chapter 5).
  - Require disposal facilities to implement Recycling Benefits Plans as a way to increase their role in ensuring recovery of recyclables from the waste stream (further described in Chapter 5).
  - Ban the disposal of unprocessed C&D material in 2003 (further described in Chapter 4).
  - Explore raising the eligibility criteria for Department Approved Recycling Program status.
  - Ensure effective administration of the Bottle Bill and support reforms to better support operation of redemption centers.

- Promote the establishment of PAYT programs in municipalities.
  - Provide grants to assist in the development of PAYT programs.
  - Provide technical assistance to municipalities on implementing PAYT programs.

- Increase commercial recycling efforts throughout the Commonwealth.
  - Establish main street business recycling/composting cooperatives.
  - Explore regulation revisions that would remove barriers to recycling/composting.
  - Foster the development of a commercial organics collection infrastructure.

- Continue to provide grants for the development of municipal recycling infrastructures.
  - Provide recycling collection trucks for new and expanding programs.
  - Provide set-out containers and toters to sustain and expand programs.
  - Examine other equipment needs to assist in creating and expanding materials collected.
  - Assist municipalities in developing a cathode-ray tube (CRT) collection infrastructure.

- Increase the program eligibility and awards provided through the Municipal Recycling Incentive Program.
  - Increase payments for tons recycled by municipalities.
  - Promote the enhancement of increased collection opportunities.
  - Encourage the development of promotions and programs to increase participation.
  - Improve and expand efforts to increase the purchasing of recycled products and environmentally preferable products.

- Enhance efforts to raise awareness and promote participation in recycling programs.
  - Create a statewide recycling participation campaign.
  - Publish municipal recycling rates annually to raise awareness of municipal recycling performance.
  - Distribute recycling information mailings to residents.
  - Actively educate and promote recycling to businesses.
  - Create informational tools to help better educate businesses and residents on the benefits of recycling to the Massachusetts environment and economy.
  - Continue to provide educational assistance on recycling to children through public schools and other forums.

- Offer grants to municipalities and regional groups to establish regional transfer stations.
  - Promote regional cooperation in the transport of recyclables and composting.
  - Provide transfer trailers to reduce the cost of transporting recyclables.

- Increase technical assistance to businesses, municipalities and consumers on recycling and composting.
  - Provide regional recycling coordinators to build capacity of municipal programs.
  - Enhance recycling/composting programs within state and municipal governments.
  - Research and test innovative recycling/composting collection technologies.
  - Provide information on the collection and processing of recyclables/compostables.
  - Use state contracts to provide cost-effective recycling/composting services.

Recycling Market Development Plan

Massachusetts manufacturers already use close to 4 million tons of post-consumer and post-industrial materials each year to make new products. Recycling markets are critical to reaching the milestones in this Plan. Developing and improving markets for recyclables will improve recycling rates and allow us to reap the environmental and economic benefits of recycling. Expanding the recycling base through market development will maximize the amount of recyclable materials that move through markets. Recycling market development will also increase the competitiveness of the state's industries, reduce unemployment, and create improved job opportunities for Massachusetts workers. Today, companies in the state that use

recycled materials employ 19,000 people and these jobs are linked to an additional 20,000 jobs in industries that support recycling.

In implementing the market development strategies listed below, DEP will make use of the *Strategic Plan for Recycling Market Development*, prepared by the Chelsea Center for Recycling and Economic Development. This Plan assesses the current and projected supply and demand for target recyclable materials, identifies material grades with high recycling market development need and potential, and lays out actions to create markets for specific materials as well as an overall approach for recycling market development for Massachusetts. Recommendations in the Strategic Plan include creation of a network of recycled product manufacturers, a methodology for keeping up with changing markets, and ways to attract and promote recycling businesses.

Key programs in our market development strategy include:

- Use EOEA's Product Stewardship Initiative to encourage manufacturers to design for recycling and to use recyclables in the manufacture of products.

- Provide financial assistance to support recycling related businesses and industry.
  - Continue the Recycling Industries Reimbursement Credit program, which provides grants for capital investments for recycling processors and manufacturers to either establish or increase their use of recycled feedstocks.
  - Continue the Recycling Loan Fund which helps meet the financial needs of the recycling industry (haulers, collectors, processors, manufacturers, and retailers) by offering a wide variety of financing options, with loans ranging from $50,000 to $300,000.
  - Continue to fund and support the Chelsea Center for Recycling and Economic Development (Chelsea Center).[6]
  - Continue promoting and participating in regional Recycling Investment Forums and seminars that provide recycling industries with business development and finance training and networking opportunities.

- Provide and promote market assistance and planning.
  - Revise the Beneficial Use Determination (BUD) regulations in a way that enhances market development efforts and opportunities, while protecting the environment.
  - Provide information on recycling markets through publications and services such as DEP's *Recycling Services Directory* and *Hauler Report*, which lists haulers and processors by recyclable commodity.
  - Continue to track market trends and participate in national and regional initiatives on supporting recycling market development (e.g., U.S. EPA's Jobs Through Recycling Program, Northeast Recycling Council).
  - Continue to work with the Chelsea Center to provide technical and business assistance to Massachusetts recycling manufacturers, and to conduct research on recyclables markets and products.

[6] The Chelsea Center for Recycling and Economic Development, affiliated with the University of Massachusetts at Lowell, provides technical assistance to Massachusetts businesses to increase their use of secondary materials.

- Pursue legislation aimed at increasing markets for recycled materials (e.g., used oil take back).

- Promote state recycled product purchasing.
  - Through the Operational Services Division, continue to promote recycled and environmentally preferable product (EPP) purchasing, hold annual recycled and environmentally preferable products conferences and vendor fairs, and offer training to state and municipal purchasing officials on recycled and EPP purchasing.
  - Continue to work with MassHighway's Recycling Coordinator to promote the use of pollution prevention techniques and recycled products in state and municipal highway construction and operations activities.
  - Continue efforts through the multi-agency Environmentally Preferable Products Workgroup to promote EPPs among government, business, and consumers.
  - Continue working with the Division of Capital Asset Management to promote recycling and the use of recycled products in state and municipal construction projects.

- Promote municipal recycled product purchasing.
  - Continue Massachusetts Recycling Incentive Program (MRIP) minimum eligibility criteria that require municipalities to adopt buy-recycled ordinances and meet increasing buy-recycled criteria over time, such as testing and evaluation of recycled products.
  - Continue Municipal Core Grant Program minimum eligibility guidelines that require municipalities to adopt a buy-recycled policy.
  - Continue the municipal state matching grant for the purchase of recycled products (2 for 1 purchasing), including recycled plastic products.
  - Through Municipal Technical Assistance Grants, continue to fund municipal Buy Recycled projects that, through use and evaluation of recycled products, will provide valuable information on product performance to other municipal officials and promote greater recycled purchases.

- Recycled business and consumer purchasing.
  - Continue funding WasteCap's technical assistance and outreach programs to boost recycled product purchasing by Massachusetts private businesses.
  - Promote Buy Recycled Cooperatives for businesses.
  - Support the Recycled Paper Purchasing Cooperative, a new venture established in conjunction with WasteCap to increase the use of recycled copy paper through volume-based pricing.
  - Continue to seek voluntary agreements with industry groups on use of recycled products.
  - Include a buy recycled consumer education effort in the statewide recycling participation campaign.
  - Emphasize the promotion of markets for C&D recyclables and other materials that face technological and economic barriers.

Food Waste Recycling Initiative

DEP has started a new initiative to increase the diversion of food waste through composting and other means such as direct animal feed, processed animal feed, and land application. DEP estimates that food waste makes up more than 10% of all municipal solid waste, and is today

primarily being disposed in the trash. The key barrier to increased composting is the lack of processing capacity, which is compounded by increasing difficulty in siting such facilities.

To increase food waste composting, processing capacity must be increased. Due to the high volume of material, efforts to site processing facilities should focus first on developing new processing facilities to handle produce and other pre-consumer food generated by the industrial/commercial/institutional (ICI) sector. Currently, diversion in this sector is roughly 5-10% of materials generated. Through increased composting, DEP hopes to see the rate increase to 60% by 2010. Increased residential organics diversion could be phased in as additional processing capacity is developed.

Once the needed processing capacity is developed, DEP will consider adding food waste to the list of materials banned from disposal starting with ICI organics and expanding the ban eventually to organics generated in the residential sector.

Key activities in our food waste reduction strategy include:

- Evaluate barriers to composting and, where necessary, make changes aimed at fostering a positive climate for composting operations.
  - ❑ Promulgate the existing draft compost facility regulations and standards for compost product quality in order to provide clear standards for facility development.
  - ❑ Seek ways to facilitate small scale research and development projects, possibly through regulatory enhancements.
  - ❑ Modify existing approval processes to consider the size and technology of proposed composting operations (e.g., small, windrow-based composting operations vs. large, in-vessel enclosed systems).

- Explore expanding the state's role in siting new composting operations.
  - ❑ Expedite the permitting process for new capacity.
  - ❑ Maintain a comprehensive inventory of organics generation by type, quantity, and concentration by geographic area (i.e., density mapping to be used to facilitate the development of local organics collection infrastructures).
  - ❑ Assist compost facility proponents in identifying appropriate sites within designated areas.
  - ❑ Support or facilitate the use of brownfields as potential compost operation sites.
  - ❑ Insure adequate Massachusetts disposal capacity for residuals generated in the composting process.
  - ❑ Establish comprehensive organics recycling at all state correctional facilities, hospitals, and other state institutions where organics are generated in significant volume, to allow effective demonstration of organics recycling programs.
  - ❑ Work with the Department of Food and Agriculture to expand farm composting.

- Implement a Composting Education Campaign.
  - ❑ Conduct outreach to local permitting officials to foster better understanding of the composting process, the environmental and economic benefits, options for managing organic wastes, and the need for increased processing capacity.

- ❑ Undertake efforts to raise awareness among the general public, citizens groups, Chambers of Commerce, state legislators, and other stakeholders about the need for, and benefits of, composting and recycling.
- ❑ Educate generators of food waste, such as restaurants and grocery stores, on how to manage food to create less waste in the first place, and on how to ensure proper separation of compostable organics from non-compostable organics.

- Provide Grants and Technical Assistance.
  - ❑ Provide grants to the public and private sectors for research and development, product quality testing, compost operator training, capital equipment, assistance in developing in-house training materials for generators, and marketing of end-products.
  - ❑ Establish a composting operators training and certification course to promote well-run facilities.
  - ❑ Create an organics home page on DEP's web site to facilitate the exchange of information among various organics industry sectors.
  - ❑ Establish an internet forum for technical composting issues and make information available on the home page.
  - ❑ Maintain a directory of financial assistance, business, economic development organizations, and community development corporations to assist facility developers in accessing financing and business resources.

Promoting Innovative Technologies

DEP recognizes that new and innovative technologies are critical to supporting our source reduction, toxicity reduction, and recycling strategies. Innovative technologies can provide opportunities to increase the reuse and recycling of waste materials, reducing the need for disposal capacity, and improve the efficiency of collection, processing, recycling or remanufacturing.

DEP supports innovative technologies through regulatory assistance, pilot projects, and cooperation and information sharing with other states and national organizations. The STrategic Envirotechnology Partnership (STEP) program, administered by EOEA, the Department of Economic Development, and the University of Massachusetts, also provides assistance to companies developing and implementing innovative technologies.

Examples of waste management innovative technologies include co-composting projects in the towns of Marlborough and Nantucket which use a containerized, or in-vessel, process to compost the organic portion of their municipal solid waste and wastewater treatment sludge. Using this process, diversion rates of up to 90% can be achieved.

Another example of processing organic waste is thermophilic digestion, which applies high temperatures to a feedstock of wood, vegetative, and other organic portions of the waste stream. In one project, researchers at two U.S. laboratories have taken biomass materials, such as pulp and paper mill wastes, and created a biodegradable herbicide. The pulp and paper waste is converted into levulinic acid, a chemical "building block" that is normally produced from refined petroleum. It can now be produced from biomass at an estimated one-tenth the cost of using petroleum.

Specific ways in which DEP will continue to support innovative technologies that support waste reduction include:

- Researching innovative technology projects focusing on creating new processing techniques for recycling a greater range of materials, developing new uses for recyclables, and initiating pilot projects to evaluate and test new technologies and products.
- Seeking technologies with the potential to increase the reuse of wastes and materials that are of key concern in Massachusetts (e.g., organics, C&D debris, contaminated soils, paper sludge).
- Ensuring that regulatory requirements for the permitting of innovative technologies do not create inappropriate barriers to their use.
- Disseminating information about new technologies to DEP staff and potential users through the Innovative Technologies Clearinghouse, technical briefings, and technical reports.
- Providing appropriate regulatory assistance and referrals to other programs such as STEP for promising technologies identified through the Recycling Industries Reimbursement Credit program and the Chelsea Center.

Chapter Three: Generation and Management of Solid Waste

This Chapter presents updated statewide solid waste generation and management information and describes significant trends in the waste management system. This Chapter also explains waste reduction – a new way to measure statewide milestones that includes both source reduction and recycling. A description of how DEP collects and analyzes solid waste data can be found in Appendix A: Data Methodologies.

Solid Waste Generation and Management, 1994 - 1999

Table 3-1 presents a comprehensive picture of the generation and management of solid waste in Massachusetts for calendar years 1994-1999.

Table 3-1: Solid Waste Generation and Management 1994 – 1999 (in tons per year)

	1994	1995	1996	1997	1998	1999
Total Generation	**9,710,000**	**10,780,000**	**11,600,000**	**11,870,000**	**12,390,000**	**13,090,000**
Exports	*430,000*	*470,000*	*820,000*	*860,000*	*1,210,000*	*1,650,000*
MSW	7,050,000	6,760,000	7,330,000	7,680,000	7,930,000	8,140,000
Residential	2,870,000	3,130,000	3,280,000	3,670,000	3,660,000	3,680,000
Commercial	4,180,000	3,630,000	4,050,000	4,010,000	4,270,000	4,460,000
Non-MSW	2,660,000	4,020,000	4,270,000	4,190,000	4,460,000	4,950,000
C&D	2,420,000	3,760,000	4,010,000	3,840,000	4,270,000	4,700,000
Other	240,000	260,000	260,000	350,000	190,000	250,000
Total Management	**10,080,000**	**10,760,000**	**11,430,000**	**11,350,000**	**11,360,000**	**11,550,000**
Imports	*800,000*	*450,000*	*650,000*	*340,000*	*180,000*	*100,000*
Diversion	4,060,000	5,040,000	5,310,000	5,490,000	5,960,000	6,590,000
MSW	2,160,000	2,140,000	2,410,000	2,590,000	2,840,000	3,070,000
Residential Recycling	420,000	460,000	470,000	490,000	500,000	510,000
Commercial Recycling	1,070,000	1,010,000	1,270,000	1,020,000	1,220,000	1,440,000
Residential Composting	440,000	440,000	440,000	360,000	350,000	350,000
Residential On Site Composting	-	-	-	530,000	550,000	550,000
Commercial Composting	230,000	230,000	230,000	190,000	220,000	220,000
Non-MSW	1,900,000	2,900,000	2,900,000	2,900,000	3,120,000	3,520,000
C&D	1,900,000	2,900,000	2,900,000	2,900,000	3,120,000	3,520,000
Disposal	6,020,000	5,720,000	6,120,000	5,860,000	5,400,000	4,960,000
Landfill	2,680,000	2,510,000	2,830,000	2,620,000	2,260,000	2,020,000
MSW	1,900,000	1,540,000	1,620,000	1,430,000	1,060,000	960,000
C&D	550,000	700,000	910,000	890,000	1,070,000	920,000
Other	230,000	270,000	300,000	300,000	140,000	140,000
Combustion	3,340,000	3,210,000	3,290,000	3,240,000	3,140,000	2,940,000
MSW	3,320,000	3,190,000	3,250,000	3,230,000	3,130,000	2,940,000
Non-MSW	20,000	20,000	40,000	10,000	*0	*0

* Residential on-site composting is included in Residential and Commercial composting.
**Non-MSW combustion was less than 5,000 tons

The data in Table 3-1 for the years 1994 – 1996 is unchanged from what was reported in the *1997 Solid Waste Master Plan Update*. For the years 1997 – 1999 DEP improved its

methodology for collecting and analyzing solid waste data. Three key changes that were made are:

- In past years, 200,000 tons of MSW was added to reported import tonnage because it was assumed that imports from other states were underestimated. The 200,000 tons import assumption has been removed since DEP now receives better quality import and export data from solid waste facilities and agencies in other states.

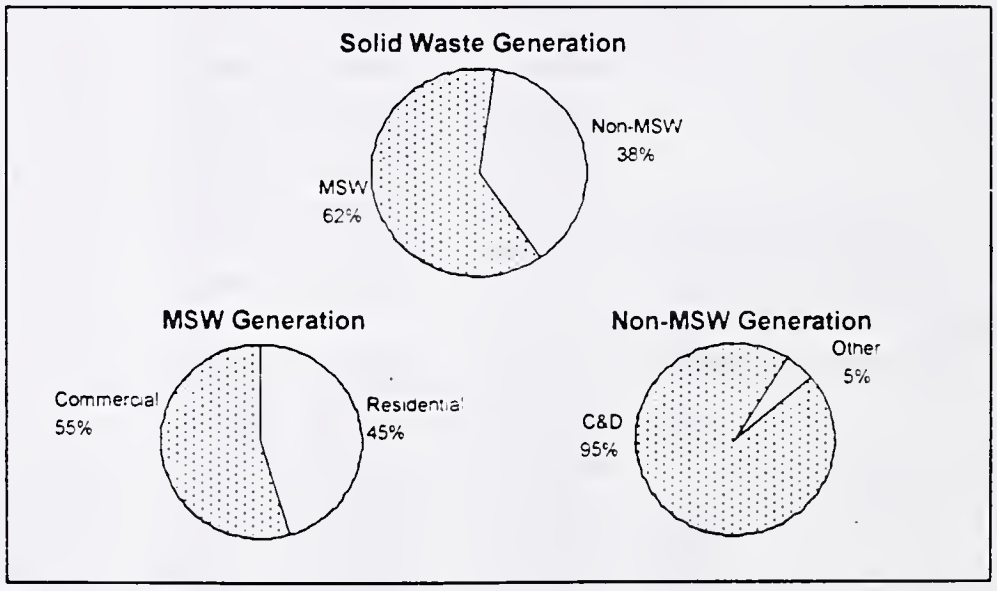
- Residential and commercial composting numbers were updated for 1998 data to better account for non-reporting composting sites. Also, estimates of backyard composting are broken out to better distinguish source reduction versus recycling activities. 1998 data was carried over into 1999.

- In past years, 200,000 tons of reported MSW disposed at landfills was assumed to be C&D debris that was misclassified by landfill operators. Therefore, this tonnage was subtracted from the reported MSW total and added to the C&D total. DEP believes that this assumption is no longer needed due to better accounting by solid waste facilities.

Appendix A describes these and other changes in further detail.

Total Waste Generation and Management

Figure 3-1: Total Solid Waste Generation in 1999



In 1999, 13.09 million tons of solid waste (MSW and non-MSW) were generated in Massachusetts (including estimates of backyard composting). Of this amount, 8.14 million tons was MSW (62%), and 4.95 million tons was non-MSW (38%). Of the 13.09 million total tons generated, 6.59 million tons was recycled (50%). Between 1998 and 1999, waste generation increased 5.7%, from 12.39 million tons to 13.09 million tons.

In 1999, 4.96 million tons (38%) of waste generated was disposed either by landfilling (15%) or by combustion (23%). The state exported 1.65 million tons and imported 0.10 million tons, and was thus a net exporter of 1.55 million tons (12%) of total waste generated.

In 1999, there were 38 landfills and 7 combustors operating in the state that received MSW and/or non-MSW.

Municipal Solid Waste Generation and Management

In 1999, 8.14 million tons of MSW was generated in Massachusetts, or 7.06 pounds per person per day. Of this amount, 38% was recycled, including on-site and off-site composting. The per capita recycling rate was 2.66 pounds per person per day, and the per capita disposal rate was 4.40 pounds per person per day.

Table 3-2: How MSW was Managed in 1998 and 1999

	1998	1999
Recycled	36%	38%
Combusted	40%	36%
Landfilled	13%	12%
Net Exported	11%	14%

Between 1998 and 1999:

- MSW generation increased 3%, from 7.93 million tons to 8.14 million tons. Per capita MSW generation rose from 6.91 pounds per person per day to 7.06 pounds per person per day.

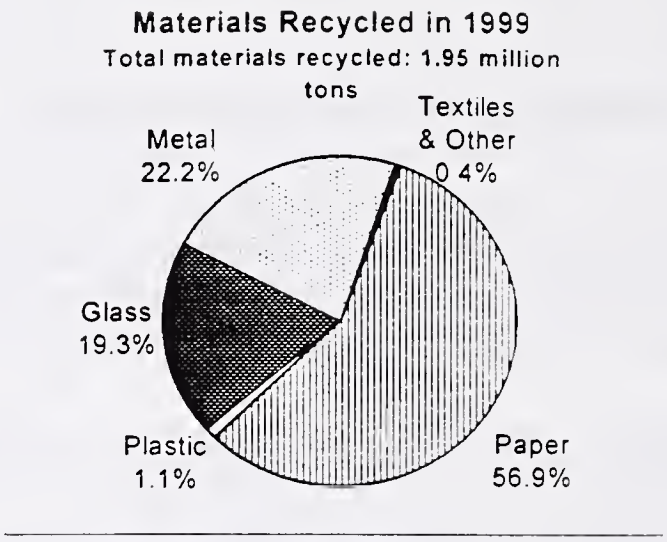
- Residential generation increased 0.6%, from 3.66 million tons to 3.68 million tons, while commercial MSW generation increased 4.7%, from 4.27 million tons to 4.47 million tons.

- MSW recycling increased from 2.84 million tons (36%) to 3.07 million tons (38%).

- MSW net exports increased by 33%, due to decreasing in-state disposal capacity and other factors such as business decisions on the part of the waste management industry.

- Total MSW disposed (disposed in state and exported out of state for disposal) decreased 0.6%, from 5.14 million tons to 5.11 million tons.

Figure 3-2: Breakdown of MSW Materials Recycled (excluding composting)



Non-Municipal Solid Waste Generation and Management

In 1999, 4.95 million tons of non-MSW were generated in Massachusetts. Of this amount, 71% was recycled (all of which was C&D debris).

Between 1998 and 1999:

- Non-MSW generation increased 11%, from 4.46 million tons to 4.95 million tons.
- The amount of non-MSW processed increased 13%, from 3.12 million tons (70%) to 3.52 million tons (71%).

In addition to non-MSW counted in Table 3-1 and in DEP's capacity estimates, there were additional materials generated and managed that have not historically been analyzed relative to disposal capacity. Please see Chapter Four for a more comprehensive discussion of the generation and management of non-MSW materials.

Transition to Waste Reduction

To measure progress in achieving our vision of reducing waste generation and disposal to the maximum extent possible, we have set a total waste reduction milestone of 70% by 2010, including 60% MSW waste reduction and 88% non-MSW waste reduction. Within the 60% milestone, we expect to achieve 24% - 34% source reduction and 43% – 53% recycling[1]. Within the 88% non-MSW milestone, we expect to achieve 13 – 23% source reduction and 80% – 90% recycling. In the past, source reduction and recycling were considered separately (e.g., the *1990 Master Plan* set two separate goals for each of these waste reduction

[1] Please note that source reduction and recycling percentages are not additive, since they are calculated as a percentage of *potential* generation and *actual* generation, respectively.

strategies). We are now considering them as two components of an overall strategy to reduce disposal that affect each other.

In 1990, DEP set both source reduction and recycling goals, but at that time did not fully understand the relationship between the two activities. In fact, source reduction has lowered the overall tonnage of leaf and yard waste, glass containers, and other materials being recycled. Yet from an overall waste reduction viewpoint, this is good news, since fewer tons of waste are being produced in the first place, resulting in fewer tons of waste that must be managed.

For example, when DEP set its 46% recycling goal in 1990, the agency estimated that over 1 million tons (or 15% of the goal) would be achieved through the diversion of leaf and yard waste. Over the past decade, the majority of leaf and yard waste has in fact been diverted from disposal. However, the method for doing so has increasingly been backyard composting (which is considered a source reduction activity since the yard waste never enters the waste management system) rather than off-site composting (which is considered recycling). If the amount of backyard composting had not been counted as recycled tonnage, our recycling rate would have been lower. To track progress in meeting the 46% recycling goal, DEP has included backyard composting in the recycling/diversion rate, since the tonnage being composted in backyards is part of the tonnage originally targeted for diversion.

Including backyard composting in the recycling rate has led to some confusion and also difficulties in comparing Massachusetts recycling rates to other states that follow the U.S. Environmental Protection Agency's (EPA) guidance for calculating MSW recycling rates. EPA's guidance focuses strictly on recycling, and therefore excludes backyard composting. A clearer distinction between recycling and source reduction will make future comparisons easier.

Measuring waste reduction will allow us to capture the effects of both source reduction and recycling since they are inter-related waste management strategies. Source reduction often can reduce the amount of material available for recycling. For example, in 1990, DEP estimated that 311,000 tons of glass containers would be recycled by 2000, contributing 5% to the overall 46% goal. However, according to industry data, glass containers have become lighter over time (a form of source reduction) and have increasingly been replaced by lighter plastic containers, reducing the tonnage of glass containers generated. Other products that have been lightweighted include aluminum cans and corrugated cardboard containers.

Over the coming decade, DEP plans to focus more attention on source reduction, and believes adopting a waste reduction milestone is the best way to measure the true impact of our efforts. There are difficulties in doing this however. Removing backyard composting from our recycling rate could give the mistaken impression that we have lost ground in our overall diversion efforts. In addition, there is not yet a precise way to measure source reduction. Until we have more experience in measuring source reduction, we will continue to include backyard composting in our recycling rate, but will distinguish it from other recycling activities in order to begin transitioning to a system that better measures total waste reduction.

Measuring Waste Reduction

Waste reduction is the combined effect of source reduction and recycling as a percentage of *potential* waste generation. Table 3-3 summarizes waste reduction in 1999. Source reduction was calculated using a methodology developed by Tellus Institute (described in the next section below).[2]

Table 3-3: MSW Waste Reduction in Massachusetts in 1999 (in tons)

Projected generation without source reduction	8,297,154
Source reduction	701,980
% of projected generation	*8%*
Recycling*	2,526,123
% of projected generation	*30%*
Total Waste Reduction	3,228,103
% of projected generation	*39%*

* The recycling rate is 33% when based on actual MSW generation (excluding backyard composting).

Table 3-4 shows MSW waste reduction over time broken out for the residential and commercial sectors. Total waste reduction was 39%.

Table 3-4: Total MSW Waste Reduction 1994-1999 (in tons)

	1994	1995	1996	1997	1998	1999*
Residential Waste Reduction						
Source Reduction	514,506	344,735	401,899	632,349	715,828	851,206
Recycling	420,000	460,000	470,000	490,000	495,595	508,135
Composting (off-site)	239,026	278,801	318,576	358,351	354,863	354,863
Subtotal	**1,173,532**	**1,083,536**	**1,190,475**	**1,480,700**	**1,566,286**	**1,714,204**
Commercial Waste Reduction						
Source Reduction	(713,451)	(95,704)	(507,110)	66,711	(124,217)	(149,226)
Recycling	1,070,000	1,010,000	1,270,000	1,020,000	1,223,173	1,444,933
Composting	230,000	230,000	230,000	190,000	218,192	218,192
Subtotal	**586,549**	**1,144,296**	**992,890**	**1,276,711**	**1,317,149**	**1,513,899**
Total MSW Diversion	**1,760,081**	**2,227,832**	**2,183,365**	**2,757,412**	**2,883,434**	**3,228,103**
Projected MSW Generation	**7,051,055**	**7,239,031**	**7,524,789**	**7,859,061**	**7,968,365**	**8,297,154**
Total MSW Waste Reduction Rate	**24.96%**	**30.78%**	**29.02%**	**35.09%**	**36.19%**	**38.91%**

* based on projected GSP.

Note: negative numbers (in parentheses) show source expansion.

[2] This method also was used by the U.S. EPA in their *National Source Reduction Characterization Report for Municipal Solid Waste in the United States*, November 1999.

Measuring Source Reduction

In the past, DEP has not had a good way of measuring source reduction, which is essentially a measure of potential waste that is never generated. However, it is important to understand how source reduction contributes to waste reduction and how it affects the amount of materials in the waste stream available for recycling. Source reduction can be measured on several different levels, including at the statewide aggregate level, at a specific site (e.g., a single facility), or from a specific program (e.g., backyard composting). To better understand source reduction efforts in Massachusetts, DEP contracted with Tellus Institute in March 1999 to study source reduction in Massachusetts.

Tellus has developed a methodology for measuring aggregate source reduction based on the premise (supported by historical trends) that waste generation is closely linked to the economy: as the economy expands, waste generation grows, and vice versa. Quantities of waste that would have been generated without source reduction can be estimated using a "driver" that reflects economic activity. Tellus recommended using Gross State Product (GSP)[3] as the driver for Massachusetts. The difference between the amount of waste expected based on economic activity (the driver) and actual amounts generated is a good estimate of source reduction.

Using the Tellus methodology, DEP estimates aggregate source reduction in 1999 to be about 701,980 tons relative to a base year of 1990. This is about 8% of the MSW that would have been generated without any source reduction. Source reduction occurred mainly in the residential sector for that year.

The equation used to estimate source reduction in 1999 is:

Source Reduction in 1999= Expected 1999 Waste Generation using 1990 Generation Rate *minus* Actual 1999 Waste Generation

Gross State Product for 1999 multiplied by the 1990 generation rate provides the waste generation one would expect if the rate, or intensity, of waste generation in 1990 remained unchanged in 1999 (actual waste generated in 1990 divided by the driver for that year).

Some of the tonnage of MSW counted as source reduced by Tellus can be attributed to specific activities, many sponsored by DEP. Table 3-5 illustrates the source reduction amounts of a few specific efforts implemented in Massachusetts.

[3] GSP is the value added in production by the labor and property located in a state. GSP for a state is derived as the sum of the GSP originating in all industries in the state.

Table 3-5: Impacts of Specific Source Reduction Efforts[4]

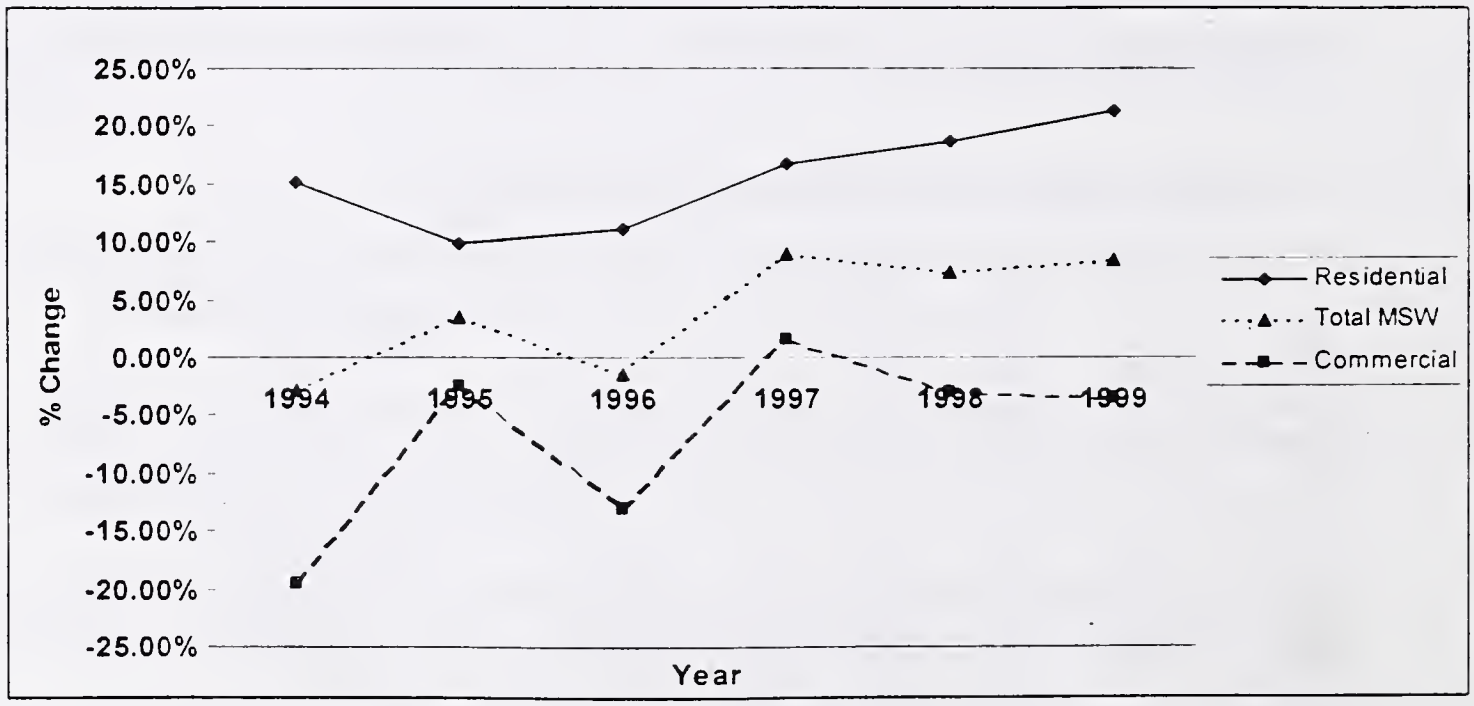
Effort	Source Reduction (in tons)
Home Diversion of Organic Material[5]	557,354
Pay as You Throw (PAYT)	43,130
Newspaper Lightweighting	55,920
Wooden Pallet Reuse	71,000

Tellus also developed estimates of additional MSW tonnage that could potentially be source reduced, totaling approximately 1.8 million tons.

Clearly, other source reduction efforts are taking place that have not been identified and/or measured. For businesses, these efforts are largely motivated by opportunities to increase efficiency and cut costs. For example, businesses are increasingly storing data electronically rather than on paper.

Figure 3-3 shows progress in source reduction estimated using the Tellus methodology for 1994-1999. The data shows significant fluctuations in source reduction estimates. This may partly be due to the varying quality of data DEP has for generation rates.

Figure 3-3: Progress in Source Reduction



Note: 1999 data is based on projected GSP for that year.

DEP will expand efforts to measure the impacts of specific source reduction programs in the coming decade, as well as to track aggregate source reduction results. Yet, it is important to note that the sum of specific programs that DEP measures will not always add up to the aggregate total; the programs are only a part of the total source reduction amounts.

[4] Tellus Institute, *Massachusetts Source Reduction Report*, December 6, 1999.
[5] Research International/Cambridge, *Residential Organic Waste Management Study*, October 1999.

Chapter Four: Non-Municipal Solid Waste Streams

Historically, state and local waste planning efforts have focused primarily on municipal solid waste (MSW). However, there are a wide variety of non-municipal solid waste (non-MSW) streams that are managed within the Commonwealth which are interdependent with and affected by MSW management.

Non-MSW materials consist of all solid waste that is not classified as MSW as well as a variety of other waste-like materials. Included in non-MSW is C&D debris, industrial wastes and sludges, wastewater treatment facility sludges, and street sweepings. It also includes certain materials that are at times handled using solid waste management practices, such as contaminated media (i.e., dredge and soils).

Non-MSW waste streams pose significant management challenges. Many of these materials are not combustible and are not readily subject to volume reduction. If improperly managed, non-MSW materials can adversely impact human health and the environment when disposed, or if no disposal or management option is readily available, the material can continue to pose human health and/or environmental problems at the location of generation.

Attempts to increase the value-added quality of these materials and to implement better reuses have not yet met with success. For the most part, these waste streams remain dependent on a diminishing number of landfills for both reuse and disposal, and they compete with MSW for disposal capacity. The decreasing number of options for landfill reuse and disposal is also leading to an increase in the number of requests for reuse options for these materials at non-landfill locations, posing new environmental and regulatory challenges to DEP.

In keeping with our vision of increasing waste reduction and minimizing disposal, we will continue to seek ways to increase source reduction and recycling of these materials, relying on disposal in landfills only as a last resort. Specific actions we will take include:

- developing strategies to increase reuse and recycling of non-MSW materials;
- banning the disposal of unprocessed C&D beginning in 2003;
- revising the beneficial use determination (BUD) regulations to make improvements to facilitate the safe use of waste materials through a more streamlined and efficient permitting process:
- creating a multi-disciplinary team within DEP to begin the work of better accounting for these materials and establishing a planning process to ensure their responsible management.

Summary of Management Options

The management of non-MSW material streams broadly falls into one of the following categories: disposal at landfills or dedicated monofills; beneficial use at landfills or monofills (either during their active stage or during closure activities); and other management means including beneficial use at non-landfill locations. Table 4-1 summarizes management of non-MSW materials in these categories. Nearly 7 million tons of non-MSW material, plus more than 1.4 million cubic yards[1] of non-MSW dredge, were generated in 1998. Of this total, C&D represents over 4.1 million tons, of which 73% was recycled or reused.

[1] Dredge materials have a high water content and therefore expressing amounts in tons would skew quantities reported.

Table 4-1: 1998 Non–MSW Materials Management (in Tons)

Material	*Approx. Generated*[1]	*Landfill Disposed*	*Beneficially Used at Active Landfills*	*Monofill Disposed*	*Beneficially Used at Monofills*	*Other Beneficially Used (Non Landfill)*	*Other Management Means*
MSW Combustion Ash	842,642			710,802	64,246[2]		67,594[3]
Coal Ash	509,017	21,527	3,500	261,469		216,614	27,434[4]
21E Contaminated Soils	357,360	9,005	189,091			115,146	44,118[5]
Non 21E Contaminated Soils	666,025	96	587,575			78,354	
Marine Dredge	1,274,229 CY	750 CY	14,620 CY			728,609 CY	530,250 CY[6]
Fresh Water Dredge	163,323 CY	1,700 CY	16,625 CY			144,998 CY	
C&D Waste	4,283,910	1,065,613	98,281[7]				3,120,016[8]
DPW Waste	*[9]	30,142	22,829				
ASR Fines	*		188,028				
Paper Sludge (DT)	96,000	65,600	30,399				
WWTP Sludge(DT)	172,000	15,600		32,800		26,700	96,700[10]
WTP (DT)	*	1,432					
Asbestos	*	7,134					
Other Daily Cover							
Kiln Dust	*		1,236				
Tire Chips	*		12,338				
Wood Chips	*		6,600				
Wood Ash	*		2,204				
Compost	*		985				
Crushed Glass	*		29				
Industrial Waste	*	34,834					
Other (Non-MSW)	*	15,244					
SUP/ Special	3,902	240					3,617
Wood Waste	*	1,251					1,001
Natural Disaster Debris							
TOTAL (Tons)	***6,930,856***	***1,267,718***	***1,143,095***	***1,005,071***	***64,246***	***436,814***	***3,360,480***
TOTAL (CY)	***1,437,552***	***2,450***	***31,245***			***873,607***	***530,250***

[1] Approximate because it does not account for imports and exports; also excludes C&D fines and non-21E soils used for landfill closures, and materials sent to certain monofills and other sites (e.g., Quarry Hills).
[2] Used as daily cover.
[3] Post-burn metals recovery.
[4] Reported as generated by one facility but without an indication of how it was managed.
[5] Incineration and thermal processing.
[6] 529,650 cubic yards was disposed at the Massachusetts Bay and Cape Cod Bay in-water disposal sites.
[7] C&D fines used as daily cover.
[8] Recycled.
[9] Generated quantities of these materials are unknown at present.
[10] 42,300 tons were exported, 53,800 tons were incinerated in state, and 600 tons were managed in state by other means.

It should be noted that a significant amount of material is not accounted for in Table 4-1, including C&D fines and non-21E contaminated soil being used to close unlined landfills that have ceased operations (and which do not submit annual reports to DEP) and Central Artery Third Harbor Tunnel excavate disposed at other sites (e.g., Quarry Hills, Hallet Street Landfill, etc.).

Dependence of Non-MSW Materials on Landfills

Excluding dredge material, approximately 35% of the estimated non-MSW tonnage is either disposed or beneficially used at active landfills. A significant amount of material is used as daily cover to control vectors, fires, and odors, and to minimize percolation of water into landfills. It is also used for grading and shaping and related engineering purposes. Table 4-2 shows that the quantities of contaminated soil and other non-MSW materials being substituted for clean soil/sand for use as daily cover and grading and shaping material are increasing as a percent of total quantities used. The use of clean soil/sand at landfills decreased from 44% to 28% between 1997 and 1998, and remained at 28% in 1999, while the use of contaminated soil and other non-MSW materials increased from 56% in 1997 to 72% in 1998 (and remained at 72% in 1999) of the total used.

Table 4-2: Reported Daily Cover Material at Active Landfills

	1997 Tons	1998 Tons	1999 Tons
Soil/Sand	881,559	431,463	331,494
Contaminated Soil	686,121	549,171	330,178
Other Materials	414,240	562,001	524,954
Total	1,981,920	1,542,635	1,186,626

The overall decrease in the total amounts of daily cover between 1997 and 1999 reflects the decrease in the number of active landfills. With fewer landfills, decreasing amounts of non-MSW material can be beneficially used in this application and increasing amounts of non-MSW material will require other management approaches, which are currently limited.

An additional quantity of non-MSW (primarily contaminated soils and C&D fines) is being beneficially used in conjunction with the closure of active unlined landfills, but these amounts do not appear in Table 4-2. The last of the active unlined MSW landfills required to close (as required by Chapter 153 of the Acts of 1992) will do so in 2000, resulting in the loss of even more outlets for the beneficial use of non-MSW materials and adding to the pressure at the remaining active landfills.

Beneficial Use Determination Review

The majority of beneficial use determinations (BUDs) that DEP has issued have been for alternative daily cover or grading and shaping material at landfills. With decreasing landfill capacity, these materials will require alternative management options.

DEP has received some BUD proposals that involve non-landfill applications; however, these types of proposals trigger many complicated issues. When waste materials are placed in the general environment, the potential for exposure to people increases and issues of risk come into

play. These types of BUD decisions cannot be made quickly, since information must be collected and analyzed demonstrating that the reuse option will not present an unacceptable risk.

To facilitate the use of BUDs, DEP is currently reviewing the BUD process and has established a BUD Subcommittee of the Solid Waste Advisory Committee to ensure outside stakeholder input. Some of the issues being discussed are types and legitimacy of uses, contaminant levels in the waste being reused, and development of use categories that reflect documentation required to support BUD requests. The goal of this review is to identify improvements in the BUD program that will both facilitate the safe use of both MSW and non-MSW materials and will result in a more streamlined and efficient permitting process.

Summary of Specific Non-MSW Materials

Construction and Demolition Debris

In 1999,[1] approximately 4.7 million tons of C&D was generated, which is the single largest category of non-MSW material. Approximately 75% was recycled or reused in some beneficial manner with the remainder being disposed almost exclusively in landfills. Due to its large volume and because a large portion of C&D can be recycled, C&D has been identified as a waste stream for which this *Plan* identifies specific actions to increase waste reduction.

Historically, C&D recycling has not received as much attention as MSW recycling in state planning efforts. C&D can be divided into three distinct types: road and bridge construction, building demolition, and new building construction. Due to available markets, there is already an infrastructure in place for recycling road and bridge material [i.e., asphalt, brick, and concrete (ABC), and metals], and these same materials are also routinely diverted from building demolition and construction waste. Table 4-3 shows the amounts of C&D generated, recycled, and disposed in Massachusetts in 1999.

Table 4-3: C&D Management in 1999

	Tons	Percent
Generated	**4,700,000**	
• **Disposed**	920,000	20%
• **Net Exported**	260,000	5%
• **Recycled**	3,520,000	75%
❑ **ABC**	*3,370,000*	*96%*
❑ **Metal**	*50,000*	*1%*
❑ **Non-fuel Wood**	*50,000*	*1%*
❑ **Other**	*50,000*	*1%*

With the current shortfall in overall disposal capacity in the state, C&D is competing with MSW for landfill space. Landfill operators prefer to take MSW over C&D, since MSW is denser and uses less space per ton than C&D. Transfer stations are also less willing to handle C&D because of its bulky characteristics and because of the lack of general disposal capacity. As a result increasing amounts of C&D are exported out of state.

[1] Please note that 1998 C&D data is used in Table 4-1 to be consistent with other data in that Table (for which 1999 data is not available).

Much of the raw C&D debris going directly into landfills contains significant amounts of materials that can be recycled, such as wood waste, roofing materials, and gypsum wallboard, but for which there are poor markets. Separation of C&D into usable (clean) and unusable components at the job site is the best way to recycle this waste stream. However, there are logistical difficulties in source separating materials at the job site, particularly in urban areas that lack space for multiple or even a single dumpster. There are also other constraints related to projects in urban areas, such as prohibitions for storing waste overnight. DEP recognizes that source separation is not feasible in these instances. Where C&D is not source separated, the technology exists to process mixed C&D to recover recyclables. While a number of new processors who take mixed C&D have started business in the last few years, additional processing capacity is needed in Massachusetts to further increase C&D recycling.

Key barriers to increased C&D waste reduction include:

- Insufficient C&D processing capacity and difficulty in siting new processing facilities.
- Diminishing disposal capacity for C&D residuals.
- Diminishing reuse capacity for C&D fines (as landfill alternative daily cover or grading and shaping material) due to the completion of most active unlined landfill closures.
- Lack of markets for wood waste and materials other than concrete, brick, asphalt, and metal.
- Difficulty of source separation of recyclable materials at construction sites due to space, cost, and logistical barriers, and lack of source separation even where it is feasible.

While barriers exist, significant gains can be made in reducing and recycling C&D waste. DEP believes that banning the disposal of unprocessed C&D in 2003, in combination with other efforts, will help achieve these gains. Such a ban would preserve landfill capacity, provide a more reliable market for processing facilities (which would in turn increase the likelihood of additional processors being proposed and sited), and provide incentives for source reduction and source separation of C&D recyclables. DEP recognizes that the availability of sufficient processing capacity and markets for processed materials is necessary before implementing a ban. DEP will consider including in proposed regulations to establish the ban a provision for delaying the ban beyond 2003, if the processing capacity is not in place or other factors indicate a ban would not be feasible or effective by 2003. In order to make a ban effective, there are a number of needed actions that DEP will promote:

- Continue to promote C&D source reduction, including promoting building materials exchanges (as described in the Source Reduction Strategy in Chapter 2);
- Continue to promote existing loan and grant programs (i.e., Recycling Loan Fund and Recycling Industry Reimbursement Credit) that can provide financial resources for the development of a C&D recycling infrastructure;
- Promote new end-use markets for processed C&D materials;
- Work with the design and construction industry to promote better design for recycling and source separation of recyclables through technical assistance and education;
- Implement pilots for job site separation of C&D for public projects and residential homebuilding;
- Explore changes to permitting requirements (at the state and local level) that would promote C&D recycling, including promoting C&D recycling in projects undergoing MEPA review

and encouraging local building permits to provide incentives to contractors to recycle the materials they use;
- Work with state agencies to explore additional specifications for the reuse of salvaged material, use of materials with recycled content, and use of appropriate C&D recyclables on state projects;
- Assist the waste industry and municipalities who are seeking to expand or site new C&D processing facilities;
- Allow C&D residuals to be used to close inactive unlined landfills. DEP has issued guidelines for using C&D materials to achieve proper grades for closing inactive unlined landfills. This policy will provide an outlet for C&D residuals, mitigate the cost of assessing and closing unlined landfills, and eliminate or reduce threats from unlined landfills;
- Establish a preference for C&D and other residuals disposal facilities as a way to promote C&D processing (see Chapter Five).

MSW Combustion Ash

There are currently 7 waste-to-energy combustors operating in Massachusetts. In 1998, there were 9 combustors operating (2 of these combustors – one in Fall River and one in Lawrence - closed during 1998). In 1998, the 9 combustors generated 775,048 tons of combustion ash (excluding recovered post-burn metals). In 1999, the remaining 7 combustors generated 736,224 tons of combustion ash (excluding recovered post-burn metals). For both years, the majority of the ash was disposed in one of 6 MSW combustion ash monofills located in Massachusetts. A number of these monofills are nearing their capacity, and therefore efforts are underway by a number of combustors to locate additional capacity.

Table 4-4: Active MSW Combustion Ash Landfills

Municipality	Site Name	Est. Year of Closure
Agawam	Bondis Island Ash Landfill	2001
Peabody	Peabody Ash Landfill	2006
Saugus	RESCO Ash Landfill	2007
Shrewsbury	Shrewsbury Ash Landfill	2008
Haverhill	Ogden Martin Ash Landfill	2009
Carver	CMW Ash Landfill	2016

Coal Ash

Approximately 500,000 tons of coal ash were generated in Massachusetts during 1998 by utilities and other large users. The majority (47%) was disposed at a single dedicated ash monofill which has capacity at its current acceptance rate through the year 2004. Forty-four percent was beneficially reused at non-landfill locations, principally in civil engineering applications, and 25,000 tons were managed at MSW landfills. Coal ash is being used increasingly as structural fill and in other civil engineering applications (e.g., production of concrete). DEP will continue to monitor the sufficiency of these outlets for handling the coal ash that is generated. In addition, DEP will monitor how forthcoming changes to the air pollution regulations for coal-fired utilities (310 CMR 7.29) may affect the volume and characteristics of coal ash generated.

Contaminated Soil

There are two broad categories of contaminated soils that can be handled through solid waste management practices: soils generated and managed pursuant to Chapter 21E and the Massachusetts Contingency Plan (MCP), and other non-21E contaminated soils. The majority of Chapter 21E soils are transported using the MCP's bill-of-lading process. Non-21E contaminated soils include those from in-state locations that do not trigger notification requirements under the MCP, such as soil contaminated with lead from lead-based paint (e.g., residential lead soil) and contaminated urban excavate below the MCP's reportable concentrations, and contaminated soil from out-of-state.

In 1998, more than 1 million tons of contaminated soil were received at Massachusetts disposal facilities. Of this amount, 76% was reused at landfills (either sent directly, or processed beforehand). 1% was disposed at landfills, 19% was reused at locations other than landfills (principally in civil engineering applications), and 4% was managed in other ways, such as incineration and thermal treatment.

Contaminated soil is currently highly dependent on MSW landfills for its management, mainly for reuse as daily cover material. Available landfill capacity can thus significantly impact the management of contaminated soil. The loss of reuse options at landfills could be a disincentive for private parties to reduce risks through cleanups (including residential lead soils) and increase the cost of development projects in urban locations, including the rehabilitation of "brownfield" sites. Options to consider in addressing contaminated soils to facilitate cleanups and risk reduction in Massachusetts include: promoting remedial technologies that provide full destruction of contaminants; permitting of facilities other than landfills that can offer treatment of contaminated soils; and developing monofills dedicated to contaminated soils.

The volume of contaminated soil is expected to continue to be significant in the future. Based on planned development projects in Massachusetts, more than 4 million cubic yards of contaminated soil will be generated over the next few years. Therefore, available landfill capacity and alternative management options for contaminated soils will continue to require analysis and planning.

Dredge Materials

Most of the marine dredge generated in Massachusetts is beneficially used in non-landfill applications (e.g., beach nourishment) or brought to in-water disposal areas. Therefore, in-state landfill capacity does not significantly affect these materials. Capacity may be needed, however, for dredge that is highly contaminated and not appropriate for in-water disposal. Based on proposed dredging projects, it is expected that between 2000 and 2006 more than 8 million cubic yards of marine dredge will be generated. The management of these materials warrants further analysis and planning.

The amount of fresh water dredge generated is much smaller than marine dredge but potentially more dependent on landfill capacity due to the lack of viable in-water disposal options. If this dredge is not contaminated (approximately 90% of 1998 generation estimates), it can be beneficially reused in an upland non-landfill application. However, if contaminated, it will likely require disposal and/or reuse at a landfill. DEP is aware of a number of fresh water dredge

projects that are not going forward or are being scaled down from their original scope due to the difficulty in finding adequate disposal capacity (e.g., the Muddy River). The availability of reuse and disposal options for fresh water dredge warrants further analysis and planning, since these options will often determine the feasibility of proposed projects.

Automobile Shredder Residue (ASR)

Automobile Shredder Residue (ASR) is generated by recycling companies that shred automobiles and white goods for metals recovery. ASR is primarily comprised of plastic, rubber, carpeting, fabric, and other non-metallic components and can potentially contain a number of hazardous constituents. In Massachusetts, metal recycling companies that generate ASR have a Conditional Declassification under the hazardous waste regulations and a Beneficial Use Determination that allows them to use ASR as alternative daily landfill cover provided they implement certain management practices to ensure that the ASR is not contaminated above threshold levels. A significant quantity of ASR is expected to be generated in the future and faces increasing competition from other materials for use as alternative daily cover.

Wastewater Treatment Plant Sludge

The majority of wastewater treatment plant sludge is burned at sludge-only incinerators or beneficially used. Modest amounts of sludge will continue to be disposed at landfills.

Paper Sludge

In 1997, 96,000 dry tons of paper sludge were generated. Of this amount, 68% was disposed at landfills and 32% was used as alternative daily landfill cover material. Paper sludge is highly dependent on landfills for its management and future volumes are expected to double in a short period of time. A proposed paper de-inking plant in Fitchburg will likely increase generation of paper sludge in 2000 to approximately 144,000 dry tons.

Disaster Debris

The disposal problems created by a natural disaster are many for all concerned. In the case of a natural disaster, a significant amount of waste material is generated rapidly. This waste must be quickly cleaned up, transported, and processed or disposed. The resulting volumes depend on the type and the severity of the disaster. Potential quantities of material generated by a natural disaster have been estimated for three scenarios and reflect the amount that would require management:

1. Category 1 Hurricane: 50,000 cubic yards.
2. Category 3 Hurricane: 3,500,000 cubic yards.
3. Seismic Event, Boston, 6.0 on Richter Scale: 10,000,000 cubic yards.

The *Commonwealth of Massachusetts Disaster Debris Management Plan* (developed by the Massachusetts Emergency Management Agency) assumes a major disaster could overload the existing waste management capacity in Massachusetts. Managing the sheer volume of debris will require: separation of debris into various component parts; an array of management methods (recycling, burning, reuse, volume reduction, and landfilling); and the commitment of both

public and private resources. Management of disaster debris warrants further analysis and planning.

Other Materials

There are a number of additional materials listed in Table 4-1 which rely to some degree on landfills for disposal and/or reuse, including street sweepings, asbestos wastes, etc. The quantities of these materials dependent on landfills are generally not large, but will continue to depend on landfill capacity in the future.

Chapter Five: Management Capacity Projections

Our waste management hierarchy places priority on source reduction and recycling as the most environmentally preferable ways to manage our waste. Proper disposal of waste in a way that ensures the protection of public health and the environment should only be relied on as a last resort to manage those materials that cannot be feasibly source reduced or recycled. In identifying and planning for our future waste management capacity needs, we will rigorously apply this hierarchy to ensure that we achieve our vision of maximum waste reduction and minimum waste disposal.

No Net Import or Net Export Goal

Since 1988, Massachusetts has maintained a policy that plans for waste disposal capacity equal to the amount generated within the state that is not recycled, so that on balance we should be neither a net importer nor a net exporter of trash. This *Plan* re-affirms this policy, recognizing that we should take responsibility for managing our solid wastes.

Currently, our management system is out of balance and Massachusetts is a net exporter of trash. To meet our goal of no net import or export, we must increase our management capacity. This increase in capacity must be done in a way that supports our goal of maximum waste reduction.

Providing for our own waste management needs makes sense from both an environmental and economic perspective. Exporting waste does not avoid the potential adverse impacts of disposal, but only changes the location where these impacts occur and creates additional impacts from increased transportation. Exporting of wastes also means losses in revenues from recyclables recovery.

Waste Management Capacity Projections

Figure 5-1 shows our projected waste management capacity need through 2010, using as a baseline our 1999 waste reduction rate and currently permitted disposal capacity. Figure 5-2 shows how we plan to address this capacity need through implementing this *Plan*. The data underlying Figures 5-1 and 5-2 are found in Table 5-2 at the end of this Chapter. Assumptions used for capacity projections also are found at the end of this Chapter.

Figure 5-1 shows a potential management need of 8.53 million tons in 2010. Figure 5-2 shows that 78% of the projected management need, or 6.65 million tons, would be met by increased waste reduction, including source reduction and increased recycling. The remaining management need, which peaks in 2005 at 2.06 million tons, would be met by additional disposal capacity.

It is important to note that, as with any forecast of the future, these projections are uncertain, but are necessary for describing and planning for our future. These projections will be revised and may change significantly from year to year depending on the actual performance of our waste

Figure 5-1: Baseline Waste Management Capacity Need

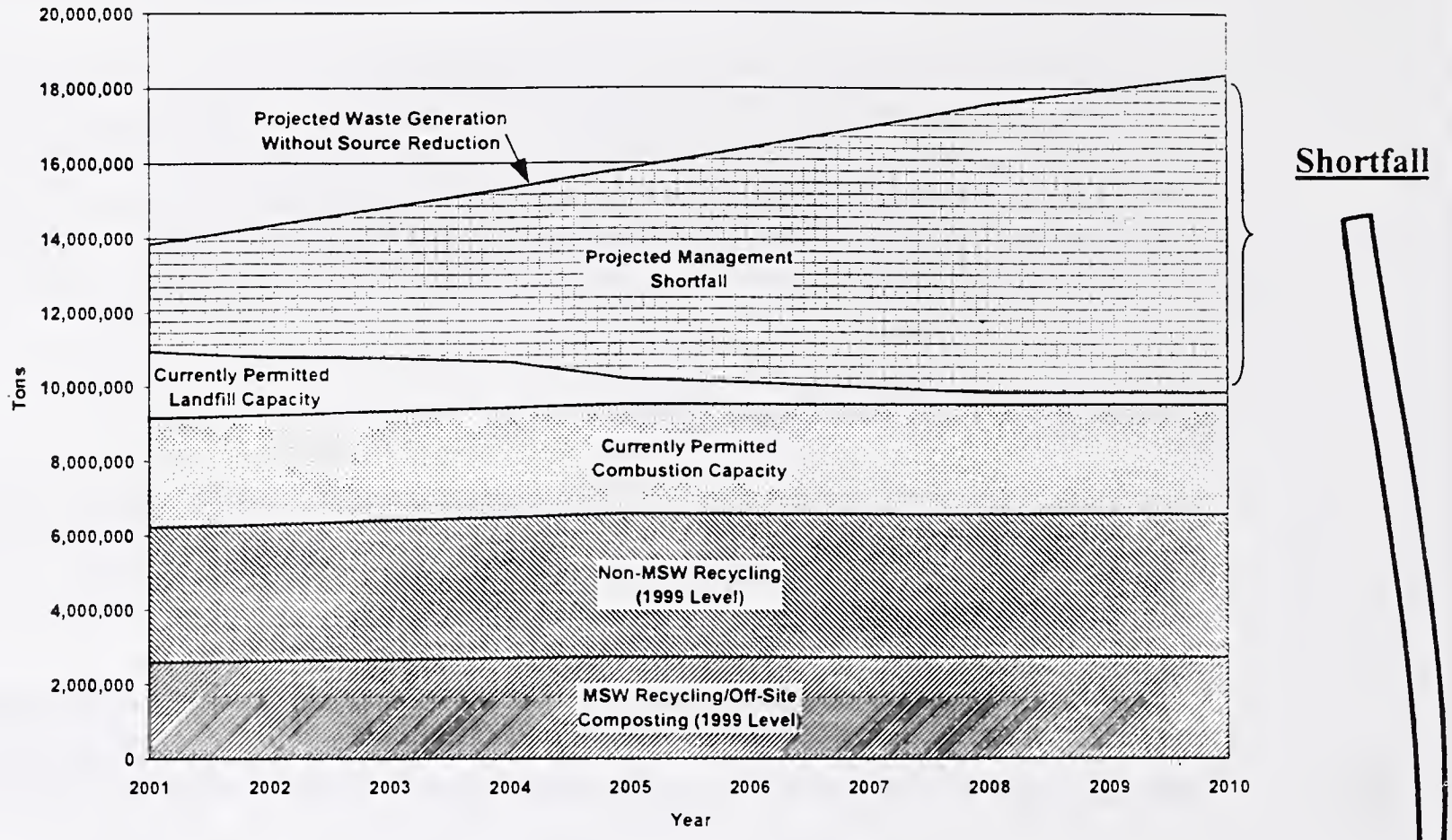
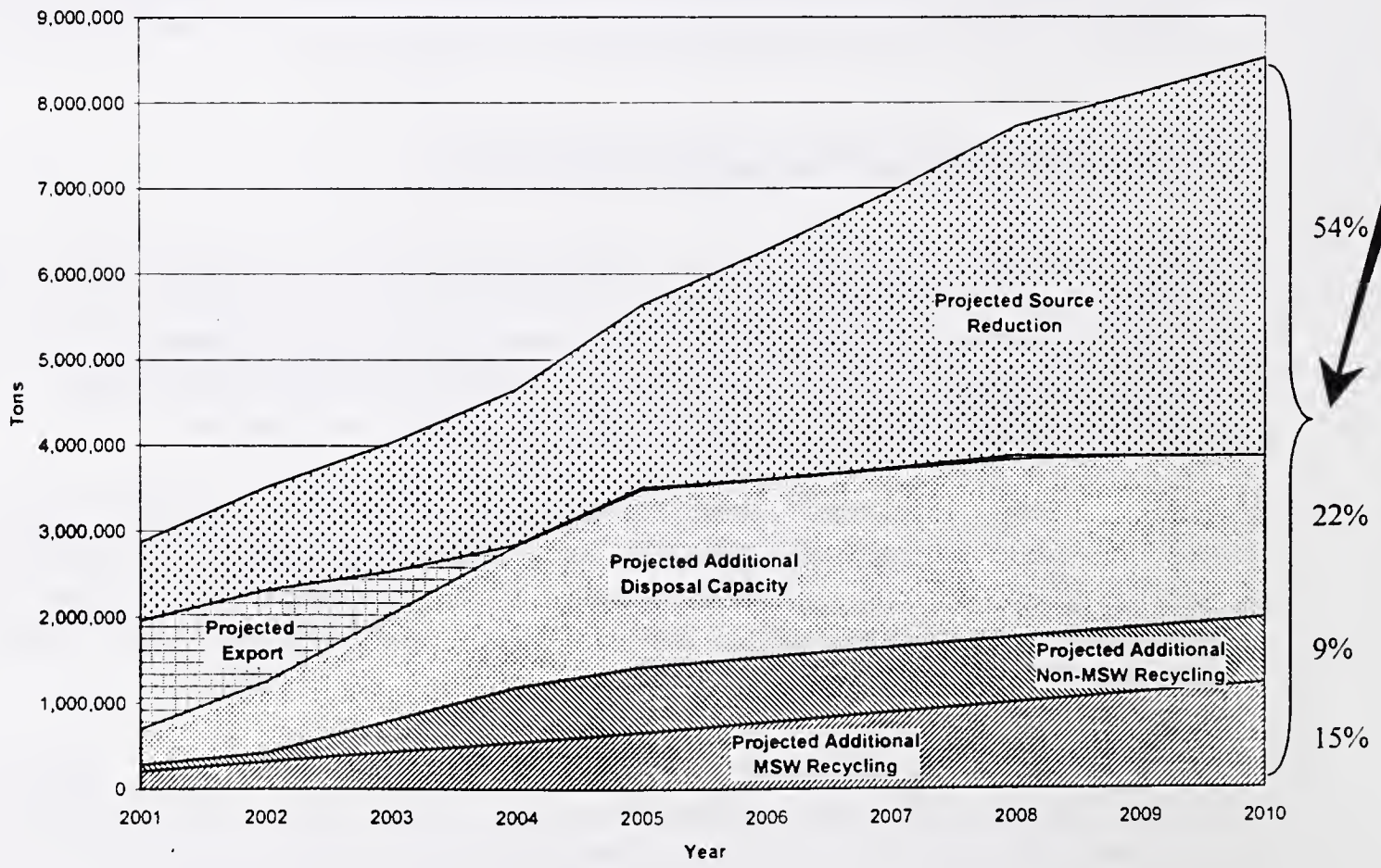


Figure 5-2: Waste Management Capacity Allocation to Meet Shortfall



management system. If waste reduction increases more than currently projected, we will need less disposal capacity than currently projected. Conversely, if waste reduction does not increase as expected, we will need to consider more disposal capacity than currently projected. We will monitor our progress annually and adjust our projections accordingly.

Chapters Two and Four describe our strategy for increasing waste reduction capacity for MSW and C&D. This Chapter describes additional disposal capacity needed, and identifies strategies to ensure that this capacity supports rather than undermines increased waste reduction.

Disposal Capacity Allocation

Our capacity projections indicate that, even if we increase our waste reduction capacity to meet our milestones, we will still need to permit additional disposal capacity. To meet this need, DEP will consider applications for additional landfill capacity, with a preference for residuals landfills that support comprehensive waste processing facilities. However, for the following reasons, DEP will not consider applications for additional combustion capacity:

- **We should avoid overbuilding long-term disposal capacity that may not be needed in the future.**

  Today in Massachusetts, waste-to-energy combustion provides a stable, long-term base of disposal capacity that handles the majority of municipal solid waste (MSW) requiring disposal (combustion accounted for 58% of MSW requiring disposal in 1999). While existing combustors are an important part of our integrated waste management system, any new combustors would need to operate at full or nearly full capacity for the next several decades in order to operate efficiently and to be cost-effective. Thus, new combustors would represent a decades-long commitment to additional disposal capacity that should not be needed in the future. Even with no new combustion capacity, if we meet our waste reduction milestones, the amount of MSW requiring disposal that would be combusted in 2010 would increase from 58% to 68%. DEP believes that this apportionment should not be increased.

- **We should maintain flexibility in adjusting the amount of capacity permitted over time.**

  Landfills complement our combustion capacity by providing flexible disposal capacity. Their throughput is flexible, and can be adjusted to take less or more waste depending on our need. They also are constructed and permitted in phases, allowing DEP to regulate capacity to ensure that we do not overbuild. Under this *Plan*, landfill expansions or new landfills will be permitted in phases. After any given landfill phase is completed, a permit must be obtained for the next landfill phase and will only be considered by DEP if capacity projections continue to show a disposal need.

- **We should ensure sufficient capacity to manage all waste streams, including those streams that are not easily combusted.**

  Landfills provide an outlet for waste that is not easily combusted, including "hard-to-manage" wastes (e.g., contaminated soils, street sweepings, C&D fines), and they play an

important role in taking "by pass" from combustor shutdowns (whether scheduled or unexpected) and waste from unforeseen events such as major storms or hurricanes. Thus, a proper balance between landfill and combustion capacity is needed to meet our integrated waste management goals.

In keeping with our vision of achieving the irreducible minimum disposal, we are also placing a greater emphasis on residuals landfills that support comprehensive waste processing facilities as the most preferable option for future disposal capacity. Residuals landfills support recycling operations such as C&D processing or MSW/sludge co-composting, and, after source separation of recyclable materials, are one of the best methods for maximizing further recycling prior to disposal. These landfills dispose of only what is left after waste has been fully processed for removal of virtually all recyclables. These facilities will be preferred over expanded[1] or new non-residual landfill facilities if requested capacity exceeds projected capacity need. In addition, residuals landfills may proceed with permitting even if the proposed capacity exceeds the disposal capacity scheduled for a given year (see the "Phased Disposal Capacity" section below). Capacity requested by such facilities will reduce future years' scheduled capacity available to other projects. By establishing a preference for these facilities, recycling will increase and future need for non-residual disposal capacity will be reduced. Residuals landfills will not be required to implement Recycling Benefits Plans, since these facilities are limited to receiving waste that has already been extensively processed prior to disposal. However, DEP will develop clearer standards for what constitutes residuals from waste processing facilities. Over time, our goal is to see residuals landfills replace traditional non-residual landfills.

It is important to note that through the site assignment and permitting process, new landfill cells and processing facilities (including transfer stations) will be required to meet all public health and environmental standards, including addressing cumulative impacts. New landfill cells also will be required to use double liner systems with leak detection (see "Permitting Strategy" below). In addition, as it becomes available, DEP will continue to review new scientific information on the potential risks from all waste management facilities (e.g., U.S. EPA's Dioxin Reassessment Study) and work to update standards as appropriate to ensure adequate protection of public health and the environment.

Permitting Strategy

In permitting additional landfill capacity, we will ensure that this capacity is linked to increased waste reduction and that public health and the environment is protected. Key components to our permitting strategy include:

- Requiring non-residuals disposal facilities, including existing combustion facilities, to implement Recycling Benefits Plans that lead them to take aggressive actions to increase source reduction, toxicity reduction, and recycling.

- Increasing waste ban enforcement.

[1] Expansions include horizontal and vertical expansions and increases in annual tonnage beyond current permit limits.

- Enhancing protection of public health and the environment from solid waste facilities by:
  - Issuing final revised solid waste facility siting criteria that provide increased protection for sensitive receptors and resources, including evaluation of cumulative impacts associated with new or expanded solid waste facilities.
  - Revising solid waste permit regulations to include evaluation of cumulative impacts associated with the expansion of solid waste facilities within site assigned areas.
  - Revising the landfill design standards to require a double liner system with leak detection for all new disposal cells.
- Phasing in disposal capacity on a yearly schedule until 2006 consistent with our no net import / no net export goal.

Recycling Benefits Plans

The waste management services industry is in a unique position to affect how businesses and citizens manage their trash. As service providers, they can educate their customers and provide services and incentives for waste reduction. As handlers of trash, they are also able to ensure that recyclables still in the waste stream are recovered in cases where waste processing is feasible. A key outcome promoted in this *Plan* is that over time the waste industry will see its role primarily as providers of waste reduction services, and only secondarily as providers of disposal services.

To encourage this role, DEP will continue to use its regulatory authority to ensure that useful materials are recovered from the waste stream to the maximum feasible extent, as opposed to simply being disposed. This regulatory authority stems from DEP's statutory mandate to protect public health, safety, and the environment through the regulation of solid waste disposal facilities.

DEP will propose changes to 310 CMR 19.000 (the Solid Waste Facility Regulations) that will require non-residual disposal facilities, as a condition of their permit, to take additional actions to ensure that the waste they dispose of has had recyclables recovered to the maximum feasible extent. DEP will not consider projects that only provide disposal capacity, but will require that projects contribute to increased waste and toxicity reduction. These regulations will set new performance standards which facilities will be held to that are designed to increase the amount of recyclables recovery over time. The revised regulations will replace the current requirement that disposal facilities demonstrate that the MSW recycling rate in their service area is at least 25%.

Specifically, the new regulations will require a Recycling Benefits Plan (RBP) to be included in disposal facility permit applications. The RBP will include:

- a waste composition analysis that will help the facility to determine a baseline amount of recyclables in the waste stream and to identify opportunities for further reductions in the amount of recyclables and hazardous products being disposed, and

- proposed actions the facility will take to decrease the amount of recyclables and hazardous products in waste that is disposed, with a commitment to meet a targeted percentage reduction in the amount of these materials by a specific date. Facilities could also propose activities that lead to source reduction. Future waste composition analyses would be used to track progress in meeting the goals set in the RBP, as well as waste ban inspection monitoring.

Initially, facilities would need to implement actions to ensure that they meet waste ban regulation performance goals. The RBP would require that over time facilities take actions to address more materials than are currently banned from disposal and to go beyond the current waste ban performance goals. RBP activities and goals would be set on a facility-by-facility basis, and would take into account the type of waste received and the sources of the waste.

DEP will develop guidance to help facilities develop acceptable RBPs that would include a menu of recycling and other waste reduction actions that could be implemented through the RBPs. Options could include providing equipment to municipalities with poor recycling rates (e.g., recycling trucks, bins), staffing a recycling coordinator position for a municipality or service area, preparing and distributing educational materials, establishing a front-end processing facility at the disposal facility or another location, contracting with a third party to process waste, etc. The RBP guidance could also set minimum benefits that must be provided by all facilities, such as regular educational outreach to customers, provision of basic hazardous product collection services, etc.

Residuals disposal facilities that meet specific performance standards would not be required to prepare RBPs, since the waste these facilities receive has already been extensively processed for recyclables recovery.

In 2001, DEP will revise the Solid Waste Management Regulations (310 CMR 19.000) to include a requirement that all non-residual disposal facilities submit and implement RBPs. Until DEP promulgates these revised regulations, DEP will rely upon the existing regulations to require any facility that applies, or has applied, to DEP for a permit or permit modification to submit and implement RBPs.

Waste Ban Enforcement

Over the past two years, increasing attention has been drawn to the crucial role the waste ban regulations play in increasing recycling in Massachusetts and preserving disposal capacity. The Recycle 2000 Task Force commissioned by EOEA affirmed DEP's proposal to expand the waste bans to transfer stations (which was done on April 1, 2000) and recommended instituting better DEP oversight as a way to significantly enhance recycling rates. Currently, waste ban enforcement is based on DEP inspections and evaluation of a facility's ability to monitor and

inspect incoming waste loads for banned materials.[2] Loads containing unacceptable amounts of these materials "fail" inspection and can be rejected or reloaded, separated for recycling, or in some cases disposed. More oversight and tougher enforcement would encourage facilities and haulers to identify their customers who do not routinely comply with waste bans and work with them to increase recycling through RBPs and other means.

In preparation for the April 2000 waste ban program changes, DEP implemented extensive outreach efforts to raise awareness of waste ban requirements among municipalities, the waste industry, and the business community. In addition, DEP tightened up facility self-monitoring and inspection procedures, instituted a more vigorous record-keeping requirement to enable DEP to better track a facility's compliance with its waste ban plan, and required facilities to contact haulers and generators who deliver loads with unacceptable amounts of banned material. To continue the momentum of this effort, DEP will:

- Hire 4 additional staff to conduct waste ban inspections and followup enforcement.
- Continue to ensure that facilities are adhering to their waste ban compliance plans and communicating with haulers and generators.
- Ban the disposal of unprocessed C&D debris in 2003 (see Chapter 4).
- Consider expanding the waste ban regulations to include additional recyclable materials not currently banned and lowering waste ban de minimis amounts.

Phased Disposal Capacity

Permitting disposal capacity must support our primary goal of increasing waste reduction to the maximum extent possible. We expect that increased waste processing, requiring disposal facilities to prepare and implement Recycling Benefits Plans, increasing waste ban enforcement, and expanding recycling programs will result in significant increases in recycling in the future, and we have based our waste reduction projections on these expectations. However, forecasts of the future are always uncertain, and therefore DEP will phase in additional disposal capacity on a set schedule, allowing for annual adjustments, with the goal of meeting no net import / no net export of waste by 2006. This will allow us to gradually meet our disposal need without over-building capacity if waste reduction capacity increases beyond initial projections.

Table 5-1 shows the total disposal capacity need (municipal solid waste and non-municipal solid waste combined) projected for 2006 after increased waste reduction capacity, and the schedule for adding the disposal capacity. In 2006, DEP projects a disposal capacity need of 2.06 million tons. To meet this need over five years, 412,000 tons of additional capacity would be needed each year.

[2] Banned materials include leaves and yard waste; metal, glass, and plastic containers; paper; automobile batteries; tires; white goods; and cathode ray tubes; see 310 CMR 19.017.

Each year DEP will publish updated solid waste system data and revised waste management capacity projections, including disposal need. Based on this information, DEP may either reduce, increase, or not change the disposal capacity schedule so that we stay on schedule for meeting our no net import / no net export goal. This approach entails DEP making one year commitments for additional disposal capacity, but holding[3] off on future years' commitments until updated solid waste system data are analyzed.

In addition, DEP will permit expanded or new landfills in phases. After an initial landfill phase is completed, a permit must be obtained for the next landfill phase and will only be considered by DEP if capacity projections continue to show a disposal need.

Table 5-1: Disposal Capacity Schedule

	2001	2002	2003	2004	2005	2006
Disposal Capacity Need	1,671,599	1,891,001	1,734,436	1,658,724	2,079,191	2,063,540
Scheduled Capacity	412,000	412,000	412,000	412,000	412,000	0
Scheduled Cumulative Capacity	412,000	824,000	1,236,000	1,648,000	2,060,000	2,060,000
Remaining Disposal Capacity Need	1,259,599	1,067,001	498,436	10,724	19,191	0

DEP will accept landfill permit applications to meet 412,000 tons of disposal capacity for 2001. This capacity will be "reserved" for a project on the date DEP receives an administratively complete permit application. If DEP finds that a permit application is not complete, or later denies a permit application, the reserved capacity will become available for other projects. Once DEP has received applications whose combined requested disposal tonnage meets or would exceed the scheduled capacity for the year, DEP will hold off on issuing permits for any additional applications until the next year's capacity schedule is published. DEP will publish these schedules by June 30th of each year.

To help inform the decisions of applicants interested in providing waste reduction capacity as well as disposal capacity, DEP will maintain a publicly available list of permit applications received and the requested annual tonnage in each application. This list will also identify where facilities are in the overall permitting process (e.g., Massachusetts Environmental Policy Act review, site assignment process, or DEP solid waste permit).

Since there is a need for additional disposal capacity over the next five years, landfill projects will be able to proceed through the site assignment process.

As in the past, DEP will maintain flexibility in permitting certain types of disposal capacity:

- disposal of waste pursuant to enforcement orders;

[3] Permits issued would not be limited to one year, but would be for the particular landfill phase in question.

- disposal of waste pursuant to an approval for a demonstration project or innovative technology;

- disposal of waste necessary to respond to an imminent threat to public health, safety or the environment, including in response to a need for immediate disposal of natural disaster debris;

- disposal of combustion facility ash or contaminated media at dedicated landfills;

- use of residuals from processing of construction and demolition debris or other non-MSW material for closure and capping of unlined municipal landfills;

- disposal of waste where DEP determines that such disposal is necessary to meet a unique local and/or regional need and the service area meets or has aggressive plans to meet the statewide recycling rate; and

- disposal of MSW waste at residuals landfills and non-MSW landfills where:
  - the MSW is generated within the municipality in which the landfill is located (host community), the amount of MSW does not exceed 50 tons per day, and the landfill implements a Recycling Benefits Plan for the MSW being disposed; or
  - DEP determines that the site is appropriate to provide reserve MSW disposal capacity.

Reserve Capacity

Beyond yearly updates to capacity projections, other contingencies may arise that require additional disposal capacity, such as the unforeseen shutdown of a facility. DEP will continue to address contingencies that may arise by temporarily permitting landfills to handle more waste. Existing landfill permits include language specifically indicating that facilities may accept waste on an emergency basis upon application to, and approval from, DEP. This mechanism is needed to temporarily allow landfills to increase the amount of waste they handle to ensure that DEP can quickly and effectively respond to waste disposal emergencies.

In allocating emergency capacity, DEP may approve capacity exceeding the total permit limit on the amount of waste a facility can take (provided it is within site assignment and MEPA limits). Possible actions include allowing permitted non-MSW capacity to be used for MSW, allowing facilities to temporarily increase the MSW or non-MSW they accept on a daily basis, within annual limits, or in certain circumstances, over annual limits. DEP will address capacity emergencies on a case-by-case basis in response to a demonstrated capacity emergency. The process will require substantiation by the affected facility.

Ensuring That Facilities Operate Safely

Integral to DEP's mission of protecting public health and the environment is the commitment to increase protection safeguards based on updated scientific information and technology advances.

Therefore DEP will promulgate three regulation revisions that would make additional waste management capacity safer.

Site Assignment Regulations

In Spring 1999, DEP held public hearings on proposed changes to the Site Assignment Regulations for Solid Waste Facilities (310 CMR 16.00) intended to provide significantly greater protection for nearby sensitive receptors. DEP received a significant number of comments both in support of and in opposition to the proposed changes. DEP has prepared a response to these comments and intends to issue the final revisions to the Site Assignment Regulations in early 2001.

The final changes will increase many of the setback distances between facilities and various sensitive receptors such as residences, private drinking water wells, and rivers, and will add new setbacks from various types of public lands and conservation areas. In addition, the changes will expand the ability of DEP and boards of health to evaluate the cumulative impacts from a proposed facility taking into consideration other pollution sources in an area, existing public health problems being experienced in that area, and the "state of the art" in our ability to identify and analyze cumulative impacts.

The revised Site Assignment Regulations will affect any new site assignment application filed after the effective date of the regulations, but will not affect existing site assignments or administratively complete site assignment applications submitted to DEP and boards of health prior to the effective date.

Landfill Permitting and Design Standards

In addition to the Recycling Benefits Plan requirements, DEP will include in the revised Solid Waste Management Regulations (310 CMR 19.000) a requirement that all solid waste facilities comply with the cumulative impact provisions set forth in the Site Assignment Regulation revisions (310 CMR 16.40), and use double liner systems with leak detection in new landfill cells. Until DEP promulgates these revised regulations, DEP will rely upon the existing regulations to require any facility that applies, or has applied, to DEP for a permit or permit modification to comply with the cumulative impact provisions and to use double liner systems with leak detection.

Cumulative Impact Evaluations

DEP will propose to amend 310 CMR 19.000 to include cumulative impact evaluation requirements consistent with revisions to the site assignment regulations (310 CMR 16.00). These regulations will ensure that any proposed expansion of an existing facility within a site assigned area consider the cumulative impacts of such expansion in the permitting process.

Landfill Liner Design

In 1990, DEP promulgated landfill design standards in 310 CMR 19.000 that required a composite liner (consisting of two protective layers) as the minimum standard for all new landfill cells. As liner technology has improved, DEP has incorporated improved designs where appropriate in landfill cells proposed since 1990. Based on the development of better designs that are cost effective, DEP will propose to amend 310 CMR 19.000 to require that all new cells use a composite liner with leak detection. The added leak detection layer will allow detection of unacceptable leaks of the primary composite layer and containment of the leak, allowing for repairs to be made.

Waste Management Capacity Projection Assumptions

DEP based its projections of future capacity need on three key assumptions which are described below.

Waste generation is projected to increase 1.5% per year through 2005, and then to level off.

In order to plan for disposal capacity, DEP must estimate the amount of waste that will be generated in the future. There is strong evidence that solid waste generation rates are dependent on the economy. When people and businesses have more to spend, they generate more waste. Due to the economic expansion Massachusetts has experienced over the past several years, both total waste and per capita waste generation have increased (between 1998 and 1999, both by 6%).

Since it is impossible to predict future economic conditions with certainty, DEP has adopted a 1.5% per year increase as a reasonable estimate of future waste increases over the next five years. This is similar to national projections of 1.5% per year increase in MSW generation over the next five years.[4] It is important to note that while a 1.5% per year increase in generation is a slower rate of increase than historical trends in Massachusetts, a portion of the increases in historical trends can be attributed to better data collection and analysis. After 2005, no increases in waste generation are projected due to increasing uncertainty in forecasting the future and due to expected increased source reduction.

Total recycling (MSW and non-MSW) is projected to increase to 63% by 2010.

The combined recycling rate in 2010 in Figure 5-2 is 63% (an increase of 15 percentage points over the 1999 rate of 48%, excluding backyard composting). Although we are not setting specific recycling goals in our overall waste reduction milestone of 70%, our capacity projections need to assume specific future source reduction and recycling rates. Achieving our waste reduction milestones is more important than the mix of recycling and source reduction that

[4] *Characterization of Municipal Solid Waste in the United States: 1998 Update*; Franklin Associates, 1999, page 16.

contributes to it, although we expect recycling to be in the range of 58% - 68% and source reduction to be in the range of 20% - 30%.[5]

MSW Recycling

MSW recycling is projected to increase by approximately 1.4% per year reaching a rate of 48% in 2010 (up from 33% in 1999, excluding backyard composting). It should be noted that our milestone of 60% MSW waste reduction includes recycling and source reduction. For the purposes of the projection in Figure 5-2, we are assuming 48% MSW recycling and 29% source reduction[6], which combine to a waste reduction rate of just over 60%.

Non-MSW Recycling

The non-MSW recycling rate (made up entirely of C&D) has remained constant at approximately 70% for the past few years. In Figure 5-2, non-MSW recycling is projected to increase 0.5% per year until 2003 (up from 71% in 1999), and then to increase 5% per year starting in 2003 (when the proposed ban on disposal of unprocessed C&D takes effect) until reaching a total of 85%. While non-MSW recycling has not seen significant increases in the past few years, it is reasonable to assume increases in this recycling rate because a number of new C&D processors have started operating recently and because DEP will propose in regulation a ban on the disposal of unprocessed C&D beginning in 2003. For the purposes of the projection in Figure 5-2, we are assuming 85% C&D recycling and 18% source reduction[7], which combine to a waste reduction rate of 88%.

Disposal capacity is based on current disposal facility permits

The data used in Figures 5-1 and 5-2 to project disposal capacity are based on existing permits. Appendix E contains a list of active landfills and their currently permitted operational life, and Appendix F contains a list of currently permitted combustors. Waste management capacity shortfall is calculated as projected waste generation minus recycling minus permitted disposal capacity. It is important to note that the loss of landfill disposal capacity over time in Figures 5-1 and 5-2 is in many cases the result of permit expirations for current landfill cells, and not because the landfills have run out of airspace for taking additional waste. A number of landfills are planning expansions into new cells as part of their overall design life.

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[5] Please note that total source reduction and recycling percentages are not additive, since they are calculated as a percentage of *potential* generation and *actual* generation, respectively. This also is the case for the MSW and non-MSW source reduction and recycling percentages.

[6] The 29% source reduction rate in 2010 is derived by using projected Gross State Product (GSP) to calculate projected generation without source reduction (using a 1990 base year), and then comparing the projected generation to what we project will actually be generated (i.e., generation increasing 1.5% per year through 2005 followed by a leveling off).

[7] The 18% source reduction rate in 2010 is derived by using projected Gross State Product (GSP) to calculate projected generation without source reduction (using a 1998 base year), and then comparing the projected generation to what we project will actually be generated (i.e., generation increasing 1.5% per year through 2005 followed by a leveling off).

TABLE 5-2

Baseline Waste Management Capacity Projections (in tons) 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total Generation w/out Source Reduction	**13,835,357**	**14,316,302**	**14,810,203**	**15,321,522**	**15,848,709**	**16,392,632**	**16,956,142**	**17,575,502**	**17,969,730**	**18,367,863**
MSW Generation w/out Source Reduction	8,868,471	9,176,758	9,493,348	9,821,104	10,159,031	10,507,686	10,868,897	11,265,906	11,518,607	11,773,810
Non-MSW Generation w/out Source Reduction	4,966,885	5,139,545	5,316,855	5,500,418	5,689,678	5,884,946	6,087,246	6,309,595	6,451,123	6,594,052
Baseline Management Capacity	**10,950,507**	**10,788,107**	**10,763,924**	**10,650,613**	**10,195,155**	**10,099,516**	**9,979,131**	**9,835,531**	**9,835,531**	**9,835,531**
MSW Management Capacity	6,589,353	6,372,596	6,293,240	6,316,443	6,012,211	5,992,645	5,976,971	5,833,371	5,833,371	5,833,371
Non-MSW Management Capacity	4,361,154	4,415,511	4,470,684	4,334,170	4,182,944	4,106,872	4,002,160	4,002,160	4,002,160	4,002,160
Baseline MSW Recycling	2,582,164	2,620,896	2,660,209	2,700,113	2,740,614	2,740,614	2,740,614	2,740,614	2,740,614	2,740,614
Baseline Non-MSW Recycling	3,623,803	3,678,160	3,733,332	3,789,332	3,846,172	3,846,172	3,846,172	3,846,172	3,846,172	3,846,172
Currently Permitted Total Landfill Capacity	1,803,819	1,548,330	1,429,661	1,220,447	667,647	572,009	451,623	308,023	308,023	308,023
Currently Permitted MSW Landfill Capacity	1,066,468	810,979	692,310	675,610	330,875	311,310	295,635	152,035	152,035	152,035
Currently Permitted Non-MSW Landfill Capacity	737,351	737,351	737,351	544,837	336,772	260,699	155,988	155,988	155,988	155,988
Currently Permitted Combustion Capacity	2,940,721	2,940,721	2,940,721	2,940,721	2,940,721	2,940,721	2,940,721	2,940,721	2,940,721	2,940,721
Management Need	**2,884,850**	**3,528,195**	**4,046,279**	**4,670,909**	**5,653,554**	**6,293,115**	**6,977,011**	**7,739,971**	**8,134,199**	**8,532,332**

Waste Management Capacity Allocation (in tons) 2001-2010

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Management Need	**2,884,850**	**3,528,195**	**4,046,279**	**4,670,909**	**5,653,554**	**6,293,115**	**6,977,011**	**7,739,971**	**8,134,199**	**8,532,332**
Total Source Reduction	906,671	1,193,686	1,490,748	1,802,274	2,126,673	2,670,596	3,234,106	3,853,466	4,247,694	4,645,827
MSW Source Reduction	1,043,733	1,234,649	1,432,108	1,638,945	1,854,139	2,202,794	2,564,005	2,961,015	3,213,715	3,468,919
Non-MSW Source Reduction	-137,063	-40,963	58,640	163,330	272,533	467,801	670,101	892,451	1,033,979	1,176,908
Total Additional Recycling	306,580	443,508	821,095	1,209,910	1,447,690	1,562,520	1,682,905	1,826,505	1,896,386	2,004,134
Additional MSW Recycling	230,020	339,898	453,020	569,459	689,290	804,119	924,505	1,068,105	1,137,986	1,245,734
Additional Non-MSW Recycling	76,559	103,610	368,075	640,451	758,400	758,400	758,400	758,400	758,400	758,400
Cumulative Additional Disposal Capacity	412,000	824,000	1,236,000	1,648,000	2,060,000	2,060,000	2,060,000	2,060,000	*1,990,120	1,882,371
Projected Export	1,259,599	1,067,001	498,436	10,724	19,191	0	0	0	0	0

*some amount of capacity permitted would begin to expire

APPENDIX A
Data Collection and Analysis

This Appendix describes how DEP collects and analyzes data.

Data Collection

Table A-1 shows the sources DEP relies on to track solid waste data. Each of the data sources is described below.

Table A-1: Major Solid Waste Data Sources

Data Type	Data Source
Disposal	• Annual Facility Reports
Imports / Exports	• Annual Facility Reports • Survey of Other States
MSW Recycling	• Survey of Commercial Recycling Processors • Survey of Municipalities • Bottle Bill Tonnage
Composting	• Composting Facility Reports • Survey of Municipalities • Residential Organic Waste Management Study
C&D Recycling	• Survey of C&D Processors

Annual Facility Reports

In Massachusetts, all landfills, combustion facilities, and transfer stations must submit annual reports to DEP summarizing the type and quantity of waste managed. Data from the landfill and combustion facility reports provide information regarding total tonnage of waste disposed in Massachusetts. The reports also contain information on the import and export of waste.

Survey of Other States

In addition to using Annual Facility Reports, DEP gathers information on the import and export of solid waste across state lines by contacting neighboring state solid waste management agencies and significant out-of-state facilities. DEP compares amounts from each of these sources and the largest import/export amount is used.

Municipal Recycling Survey

Each year, DEP surveys all 351 cities and towns in the Commonwealth to determine the quantity of waste recycled through municipal recycling programs. Recyclables counted are generated by single-family homes and some multi-family residences. In FY2000, DEP received complete data from ? municipalities and used the information to calculate the residential generation and recycling of municipal solid waste for calendar year 1999. The survey also collects data on centralized (off-site) composting of leaf and yard waste that is used to determine the amount of residential composting[1] taking place at municipal and commercial composting facilities. DEP adjusts centralized composting of leaf and yard waste to account for non-reporting towns that operate leaf and yard waste collection programs.

Appendix B (MSW Management Overview by Municipality) provides data on each town's generation and recycling tonnage. DEP does not adjust reported recycling tonnages to account for municipalities who did not report or whose data is incomplete. However, DEP does estimate waste generation for these municipalities. DEP uses a regression analysis based on the towns that do report and multiplies the resulting index of the amount of per capita waste generated (.40 tons per year) by the population of each town lacking generation data.

Composting Facility Reports

Each year, DEP sends a composting survey to all municipal and commercial composting sites. This survey provides the total centralized composting tonnage. For sites that do not submit reports, DEP assigns tonnage based on average tons composted derived from reporting sites. To derive a base commercial composting[2] amount, the total amount of residential composting from the municipal recycling survey is subtracted from the total amount reported on the composting facility reports. 100,000 tons is added to the base commercial composting amount to account for farm composting which is not reported to DEP. This figure is an estimate from the Massachusetts Department of Food and Agriculture (DFA).

MSW Recycling Processors Survey

DEP collected 1999 MSW recycling processors data in two ways. DEP contacted roughly 60 of the state's processors by a survey that resulted in direct reporting of a significant portion of the recycled materials. For quantities handled by known processors that did not respond, DEP estimated by multiplying the number of employees at each facility (using information

[1] Composting tonnage is considered residential if it originates from a residential source, regardless of where it is composted.

[2] Composting tonnage is considered commercial if it originates from a commercial source, regardless of where it is composted.

obtained from InfoUSA) by productivity indices (developed in a study done by Research International/Cambridge in 1998).

C&D Processors Survey

DEP performed written and telephone surveys of all known companies that processed construction and demolition (C&D) debris for reuse. The companies were surveyed for information on the type and amount of material processed, and the results were used to estimate the C&D diversion rate. DEP attempted to contact all the processors that handle C&D waste. For quantities handled by known processors that did not respond, numbers from the last survey performed in 1998 were carried forward.

Bottle Bill Tonnage

Bottle bill recycling results are credited toward the residential recycling rate. Container recovery (i.e., deposit redemption) rates were obtained from the Massachusetts Department of Revenue for 1999. DEP estimates the recycled tonnage using trade association data on both material composition (glass, aluminum, plastic, etc) of the beverage containers recovered and average unit weights for different container types. Composition percentages were adjusted based on information provided by deposit container collection companies to reflect the specific conditions in Massachusetts.

Data Calculations

The following formulas and definitions are used to estimate quantities in Table 3-1, Solid Waste Generation and Management, 1994 – 1999. The terms, emphasized in bold type, are presented in the same order in which they appear in the table. Also, completely lower case terms are not included in the table but are calculated in the data analyzed.

Total Generation = Disposal + Diversion + Exports - Imports

Exports are estimated using data from Annual Facility Reports and a survey of other states

MSW Generation = MSW Disposed + MSW Diverted + MSW Exported - MSW Imported
Residential Generation = Residential Recycling + Residential Composting + Residential On-site Composting + Bottle Bill + MSW Disposed.
Commercial Generation = MSW Generation - Residential Generation

Non-MSW Generation = C&D + Other Generation
C&D Generation = C&D Disposed + C&D Diverted + C&D exported – C&D imported
Other (non-MSW) Generation = Other Disposed + Other diverted + Other exported – Other imported

Total Management = Diversion + Disposal

Imports are estimated using data from Annual Facility Reports and a survey of other states

Diversion = MSW Diversion + Non-MSW Diversion

MSW Diversion = Residential Recycling + Commercial Recycling + Residential Composting + Residential On-site Composting + Commercial Composting

Residential Recycling is estimated using municipal recycling survey data plus bottle bill data.

Commercial Recycling = MSW Recycling (estimated using commercial processors survey and bottle bill data) - Residential Recycling

Residential Composting is estimated using the municipal recycling survey data.

Residential On-Site Composting is estimated using the *Residential Organic Waste Management Study* and includes yard waste, food waste and paper waste.

Commercial Composting is estimated using composting facility report data – Residential Composting + DFA estimates.

Non-MSW Diversion = C&D diversion

C&D diversion is estimated using data from the C&D processors survey

Disposal = Landfill Disposal + Combustion Disposal

Landfill Disposal = MSW Disposal + C&D Disposal + Other Disposal

MSW Disposal is estimated using data from Annual Facility Reports

C&D Disposal is estimated using data from Annual Facility Reports

Other Disposal is estimated using data from Annual Facility Reports, and represents all non-MSW disposal other than C&D (e.g., contaminated media, recycling residues, industrial waste, street sweepings, etc.)

Combustion = MSW Combustion + non-MSW Combustion

MSW Combustion is estimated using data from Annual Facility Reports

Non- MSW Combustion is estimated using data from Annual Facility Reports

Methodology Improvements

DEP made the following key improvements in data collection and analysis for 1998 data, and, where possible, applied these improvements to 1997 data:

- Updated commercial recycling processor survey by:
  - Reducing recycling processors list from approximately 120 firms to approximately 85 to avoid double counting. (Some of the companies listed collected materials and then transferred them to other processors).
  - Directly surveying larger processors.
  - Extrapolating recycling tonnage for smaller processors. DEP used updated recycling employment-to-productivity indices (developed by Research International/ Cambridge) and using updated employment information from InfoUSA to estimate tonnage.
- Updated recycled textiles tonnage by telephone survey
- Updated C&D processors surveys.
- Updated on-site composting information by conducting the *Residential Organic Waste Management Study*.
- Improved off-site composting estimates by assigning tonnage to non-reporting facilities based on responding facilities.
- Differentiated backyard composting from off-site estimates.
- Excluded from disposal tonnage total metals recovered from incinerators to avoid double counting. These materials will only be counted as recyclables.
- Removed an assumption used since 1995 that an additional 200,000 tons of waste is imported annually into Massachusetts but not accounted for. This 200,000 tons of additional import assumption artificially decreased generation rates calculated in the past.
- Removed an assumption used since 1995 that 200,000 tons of reported MSW disposed in landfills is actually C&D misclassified as MSW.

APPENDIX B

MSW Management Overview By Municipality, 1999

Municipality	MSW Recycled: Glass, Metal, Paper, Plastic and Textiles	MSW Disposed	MSW Generation Rate* tons/person/year	Estimated Population	MSW Generation* (Recycled+Disposed)
ABINGTON	1,237	5,653	0.48	14,263	6,891
ACTON	2,080	3,240	0.28	19,281	5,320
ACUSHNET	278	3,815	0.41	9,907	4,093
ADAMS	2,202	10,368	1.38	9,108	12,570
AGAWAM	2,483	9,687	0.44	27,536	12,170
ALFORD	72	586	1.55	425	658
AMESBURY	323	4,110	0.29	15,520	4,433
AMHERST	2,529	2,640	0.14	36,504	5,169
ANDOVER	3,241	11,888	0.47	32,199	15,129
ARLINGTON	4,791	19,592	0.56	43,587	24,383
ASHBURNHAM	394	451	0.14	6,072	846
ASHBY	401	0	0.40	2,934	1,174
ASHFIELD	249	434	0.38	1,811	683
ASHLAND	1,428	5,207	0.47	14,240	6,634
ATHOL	0	0	0.40	11,917	4,767
ATTLEBORO	3,022	13,007	0.39	41,103	16,029
AUBURN	0	0	0.40	15,532	6,213
AVON	308	1,800	0.47	4,485	2,108
AYER	378	2,000	0.34	7,015	2,378
BARNSTABLE	4,777	20,981	0.58	44,230	25,758
BARRE	106	0	0.40	4,847	1,939
BECKET	150	329	0.25	1,900	479
BEDFORD	1,394	4,659	0.46	13,272	6,053
BELCHERTOWN	507	817	0.10	13,200	1,324
BELLINGHAM	1,006	5,500	0.42	15,467	6,506
BELMONT	2,812	9,865	0.50	25,349	12,677
BERKLEY	488	616	0.22	5,114	1,104
BERLIN	0	0	0.40	2,348	939
BERNARDSTON	252	275	0.24	2,154	527
BEVERLY	3,190	18,223	0.55	38,713	21,412
BILLERICA	2,089	17,699	0.51	38,937	19,788
BLACKSTONE	472	1,546	0.23	8,809	2,018
BLANDFORD	228	0	0.40	1,259	504
BOLTON	529	1,328	0.51	3,651	1,857
BOSTON	30,562	248,000	0.49	574,283	278,562
BOURNE	2,529	6,541	0.53	17,040	9,070
BOXBOROUGH	265	1,353	0.34	4,753	1,618
BOXFORD	1,157	1,995	0.38	8,251	3,152
BOYLSTON	0	0	0.40	3,641	1,456
BRAINTREE	2,687	16,175	0.56	33,836	18,862
BREWSTER	1,093	6,553	0.91	8,364	7,646
BRIDGEWATER	0	2,492	0.40	23,331	9,332
BRIMFIELD	0	0	0.40	3,135	1,254
BROCKTON	3,980	33,126	0.39	95,994	37,106

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Municipality	MSW Recycled: Glass, Metal, Paper, Plastic and Textiles	MSW Disposed	MSW Generation Rate* tons/person/year	Estimated Population	MSW Generation* (Recycled+Disposed)
BROOKFIELD	310	350	0.21	3,159	660
BROOKLINE	4,474	13,987	0.33	55,407	18,461
BUCKLAND	147	258	0.21	1,967	405
BURLINGTON	1,920	8,838	0.47	22,739	10,758
CAMBRIDGE	7,925	21,719	0.30	99,858	29,645
CANTON	1,690	7,744	0.50	18,725	9,434
CARLISLE	858	0	0.40	4,700	1,880
CARVER	0	0	0.40	11,843	4,737
CHARLEMONT	89	217	0.24	1,294	306
CHARLTON	47	0	0.40	14,000	5,600
CHATHAM	1,274	2,497	0.56	6,750	3,771
CHELMSFORD	3,587	14,584	0.54	33,414	18,171
CHELSEA	487	11,007	0.41	28,222	11,494
CHESHIRE	260	786	0.29	3,619	1,046
CHESTER	0	0	0.40	1,317	527
CHESTERFIELD	84	138	0.21	1,048	222
CHICOPEE	3,332	17,552	0.36	57,887	20,884
CHILMARK	208	620	1.23	671	828
CLARKSBURG	0	0	0.40	1,802	721
CLINTON	0	0	0.40	13,593	5,437
COHASSET	1,175	2,916	0.57	7,152	4,091
COLRAIN	188	244	0.25	1,750	432
CONCORD	1,671	2,196	0.25	15,233	3,866
CONWAY	193	541	0.39	1,900	734
CUMMINGTON	96	385	0.60	802	481
DALTON	0	0	0.40	7,245	2,898
DANVERS	1,787	9,696	0.47	24,339	11,483
DARTMOUTH	1,332	10,819	0.43	28,017	12,151
DEDHAM	1,666	9,916	0.49	23,411	11,582
DEERFIELD	636	559	0.23	5,238	1,195
DENNIS	0	0	0.40	14,000	5,600
DIGHTON	576	962	0.27	5,739	1,538
DOUGLAS	215	1,859	0.30	6,881	2,074
DOVER	696	2,412	0.54	5,730	3,107
DRACUT	0	0	0.40	27,939	11,176
DUDLEY	258	711	0.10	9,938	969
DUNSTABLE	222	511	0.25	2,900	733
DUXBURY	1,721	6,427	0.57	14,403	8,148
EAST BRIDGEWATER	955	2,492	0.29	11,814	3,446
EAST BROOKFIELD	184	653	0.39	2,131	837
EAST LONGMEADOW	1,321	4,356	0.38	14,903	5,677
EASTHAM	485	3,880	0.82	5,300	4,365
EASTHAMPTON	797	2,433	0.20	16,000	3,230
EASTON	0	0	0.40	21,281	8,512
EDGARTOWN	973	2,900	1.23	3,138	3,873
EGREMONT	301	608	0.87	1,040	909
ERVING	133	291	0.30	1,421	424

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Municipality	MSW Recycled: Glass, Metal, Paper, Plastic and Textiles	MSW Disposed	MSW Generation Rate* tons/person/year	Estimated Population	MSW Generation* (Recycled+Disposed)
ESSEX	352	1,210	0.46	3,393	1,562
EVERETT	1,150	19,702	0.58	35,732	20,852
FAIRHAVEN	773	5,684	0.39	16,458	6,457
FALL RIVER	1,589	30,768	0.34	94,412	32,357
FALMOUTH	3,757	16,207	0.64	31,000	19,964
FITCHBURG	1,709	18,888	0.53	39,000	20,597
FLORIDA	39	352	0.51	774	391
FOXBOROUGH	0	0	0.40	16,044	6,418
FRAMINGHAM	4,581	19,244	0.36	65,904	23,825
FRANKLIN	2,856	8,885	0.41	28,500	11,741
FREETOWN	197	2,818	0.33	9,069	3,014
GARDNER	1,995	5,432	0.35	21,197	7,427
GAY HEAD	65	193	1.23	209	258
GEORGETOWN	0	0	0.40	6,720	2,688
GILL	135	201	0.21	1,583	336
GLOUCESTER	2,454	9,739	0.42	28,931	12,193
GOSHEN	61	104	0.19	862	165
GOSNOLD	18	115	1.39	96	133
GRAFTON	317	5,196	0.40	13,883	5,513
GRANBY	814	3,405	0.74	5,739	4,219
GRANVILLE	129	195	0.22	1,441	323
GREAT BARRINGTON	595	0	0.40	7,740	3,096
GREENFIELD	2,263	5,588	0.42	18,825	7,850
GROTON	1,048	2,316	0.38	8,750	3,364
GROVELAND	0	0	0.40	5,454	2,182
HADLEY	730	546	0.31	4,117	1,276
HALIFAX	408	1,057	0.20	7,200	1,465
HAMILTON	617	2,971	0.46	7,818	3,588
HAMPDEN	226	880	0.24	4,674	1,105
HANCOCK	67	106	0.25	681	173
HANOVER	1,643	6,800	0.68	12,400	8,443
HANSON	0	0	0.40	9,366	3,746
HARDWICK	215	0	0.40	2,855	1,142
HARVARD	686	1,864	0.48	5,337	2,549
HARWICH	1,566	3,973	0.44	12,500	5,539
HATFIELD	246	279	0.16	3,224	524
HAVERHILL	3,659	25,480	0.53	54,720	29,139
HAWLEY	0	0	0.40	336	134
HEATH	59	229	0.35	821	288
HINGHAM	2,682	8,400	0.54	20,385	11,082
HINSDALE	129	868	0.44	2,267	997
HOLBROOK	746	3,699	0.40	11,205	4,445
HOLDEN	880	4,444	0.35	15,082	5,325
HOLLAND	0	0	0.40	2,280	912
HOLLISTON	1,577	5,257	0.52	13,152	6,834
HOLYOKE	1,865	8,713	0.27	39,346	10,578
HOPEDALE	880	1,740	0.47	5,584	2,620

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Municipality	MSW Recycled: Glass, Metal, Paper, Plastic and Textiles	MSW Disposed	MSW Generation Rate* tons/person/year	Estimated Population	MSW Generation* (Recycled+Disposed)
HOPKINTON	1,404	4,857	0.50	12,485	6,261
HUBBARDSTON	208	1,022	0.32	3,878	1,230
HUDSON	0	0	0.40	17,770	7,108
HULL	119	0	0.40	11,125	4,450
HUNTINGTON	186	455	0.30	2,120	642
IPSWICH	1,352	4,545	0.44	13,351	5,897
KINGSTON	821	4,465	0.52	10,227	5,286
LAKEVILLE	752	1,483	0.24	9,138	2,235
LANCASTER	1,389	0	0.40	5,892	2,357
LANESBOROUGH	66	0	0.40	3,039	1,216
LAWRENCE	1,604	30,000	0.45	70,207	31,604
LEE	934	0	0.40	6,247	2,499
LEICESTER	884	0	0.40	10,731	4,292
LENOX	500	0	0.40	5,663	2,265
LEOMINSTER	2,425	10,916	0.33	40,271	13,341
LEVERETT	207	276	0.25	1,926	483
LEXINGTON	4,266	11,235	0.49	31,545	15,501
LEYDEN	0	0	0.40	683	273
LINCOLN	657	2,784	0.66	5,249	3,442
LITTLETON	845	2,495	0.40	8,280	3,340
LONGMEADOW	2,022	5,059	0.47	15,032	7,080
LOWELL	3,935	37,310	0.40	103,435	41,245
LUDLOW	1,509	6,448	0.43	18,600	7,957
LUNENBURG	0	0	0.40	9,439	3,776
LYNN	1,416	36,658	0.46	82,000	38,074
LYNNFIELD	1,043	4,549	0.49	11,327	5,592
MALDEN	1,910	26,976	0.52	55,233	28,887
MANCHESTER	823	2,433	0.58	5,569	3,256
MANSFIELD	2,044	6,065	0.40	20,400	8,109
MARBLEHEAD	6,514	11,048	0.87	20,255	17,562
MARION	458	3,773	0.84	5,045	4,231
MARLBOROUGH	724	16,877	0.53	33,032	17,601
MARSHFIELD	2,002	12,000	0.63	22,165	14,002
MASHPEE	837	8,946	0.81	12,055	9,783
MATTAPOISETT	634	2,630	0.55	5,955	3,264
MAYNARD	1,350	2,481	0.36	10,772	3,831
MEDFIELD	1,301	6,097	0.60	12,400	7,398
MEDFORD	3,232	27,568	0.54	57,407	30,800
MEDWAY	1,490	3,874	0.44	12,100	5,364
MELROSE	1,964	10,009	0.44	27,114	11,973
MENDON	537	1,568	0.42	5,000	2,105
MERRIMAC	512	992	0.25	5,935	1,504
METHUEN	2,172	15,122	0.41	41,731	17,294
MIDDLEBOROUGH	1,687	10,252	0.64	18,754	11,939
MIDDLEFIELD	48	145	0.49	394	193
MIDDLETON	536	1,806	0.36	6,534	2,342
MILFORD	2,243	9,271	0.43	26,617	11,514

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Municipality	MSW Recycled: Glass, Metal, Paper, Plastic and Textiles	MSW Disposed	MSW Generation Rate* tons/person/year	Estimated Population	MSW Generation* (Recycled+Disposed)
MILLBURY	1,462	5,723	0.59	12,228	7,185
MILLIS	386	2,263	0.34	7,700	2,650
MILLVILLE	0	0	0.40	3,000	1,200
MILTON	3,552	7,421	0.43	25,803	10,973
MONROE	0	0	0.40	114	46
MONSON	494	2,272	0.35	7,974	2,766
MONTAGUE	851	0	0.40	8,492	3,397
MONTEREY	328	302	0.67	940	630
MONTGOMERY	0	0	0.40	759	304
MOUNT WASHINGTON	44	87	0.83	157	131
NAHANT	309	1,549	0.50	3,691	1,858
NANTUCKET	5,593	12,297	2.71	6,600	17,890
NATICK	3,834	9,798	0.44	31,182	13,633
NEEDHAM	4,803	6,770	0.40	29,156	11,573
NEW ASHFORD	24	0	0.40	192	77
NEW BEDFORD	2,259	37,399	0.40	99,922	39,658
NEW BRAINTREE	0	0	0.40	926	370
NEW MARLBOROUGH	0	0	0.40	1,243	497
NEW SALEM	98	195	0.33	897	293
NEWBURY	708	4,087	0.72	6,700	4,795
NEWBURYPORT	1,734	7,470	0.55	16,794	9,204
NEWTON	12,822	29,114	0.52	80,831	41,936
NORFOLK	978	1,033	0.22	9,270	2,011
NORTH ADAMS	2,706	7,992	0.74	14,473	10,698
NORTH ANDOVER	1,884	7,623	0.39	24,279	9,506
NORTH ATTLEBOROU	5,097	4,776	0.36	27,139	9,873
NORTH BROOKFIELD	439	792	0.25	4,948	1,231
NORTH READING	800	4,752	0.45	12,300	5,552
NORTHAMPTON	3,512	0	0.40	28,879	11,552
NORTHBOROUGH	1,266	4,905	0.45	13,686	6,171
NORTHBRIDGE	381	5,780	0.44	13,988	6,161
NORTHFIELD	387	731	0.38	2,919	1,118
NORTON	0	0	0.40	15,283	6,113
NORWELL	1,022	3,859	0.48	10,169	4,881
NORWOOD	2,120	9,089	0.40	28,326	11,209
OAK BLUFFS	846	0	0.40	3,830	1,532
OAKHAM	0	0	0.40	1,689	676
ORANGE	1,429	4,286	0.78	7,312	5,715
ORLEANS	869	4,528	0.79	6,827	5,397
OTIS	236	608	0.75	1,122	843
OXFORD	0	0	0.40	13,218	5,287
PALMER	0	0	0.40	12,265	4,906
PAXTON	363	1,162	0.38	4,029	1,525
PEABODY	3,193	25,538	0.58	49,560	28,731
PELHAM	74	0	0.40	1,430	572
PEMBROKE	823	6,407	0.43	16,974	7,230
PEPPERELL	724	0	0.40	11,115	4,446

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Municipality	MSW Recycled: Glass, Metal, Paper, Plastic and Textiles	MSW Disposed	MSW Generation Rate* tons/person/year	Estimated Population	MSW Generation* (Recycled+Disposed)
PERU	44	141	0.21	868	185
PETERSHAM	562	243	0.68	1,177	806
PHILLIPSTON	0	0	0.40	1,667	667
PITTSFIELD	0	0	0.40	47,927	19,171
PLAINFIELD	62	0	0.40	609	244
PLAINVILLE	610	1,051	0.23	7,229	1,661
PLYMOUTH	2,882	19,020	0.45	49,008	21,902
PLYMPTON	0	0	0.40	2,582	1,033
PRINCETON	0	0	0.40	3,531	1,412
PROVINCETOWN	825	2,768	1.00	3,577	3,593
QUINCY	4,552	34,302	0.45	85,988	38,854
RANDOLPH	2,031	0	0.40	31,365	12,546
RAYNHAM	846	6,500	0.72	10,181	7,346
READING	2,016	8,443	0.46	22,750	10,459
REHOBOTH	394	1,555	0.19	10,007	1,949
REVERE	1,949	24,224	0.60	43,766	26,173
RICHMOND	46	642	0.40	1,710	688
ROCHESTER	247	1,972	0.49	4,500	2,219
ROCKLAND	901	3,572	0.27	16,559	4,473
ROCKPORT	1,250	3,300	0.59	7,773	4,550
ROWE	56	181	0.64	373	237
ROWLEY	0	0	0.40	5,100	2,040
ROYALSTON	177	198	0.31	1,213	375
RUSSELL	111	303	0.24	1,704	414
RUTLAND	0	0	0.40	5,303	2,121
SALEM	3,364	13,941	0.46	37,735	17,305
SALISBURY	767	3,400	0.56	7,389	4,167
SANDISFIELD	0	0	0.40	668	267
SANDWICH	1,488	7,948	0.46	20,500	9,436
SAUGUS	1,712	11,060	0.50	25,553	12,772
SAVOY	32	109	0.19	738	141
SCITUATE	1,504	4,274	0.32	18,000	5,778
SEEKONK	1,618	3,467	0.39	13,025	5,086
SHARON	1,384	0	0.40	17,298	6,919
SHEFFIELD	698	800	0.44	3,400	1,498
SHELBURNE	175	330	0.25	2,012	505
SHERBORN	536	2,364	0.65	4,442	2,900
SHIRLEY	252	0	0.40	6,140	2,456
SHREWSBURY	1,957	9,593	0.43	27,173	11,550
SHUTESBURY	201	425	0.38	1,650	626
SOMERSET	1,958	4,264	0.36	17,078	6,221
SOMERVILLE	4,438	33,511	0.48	78,385	37,949
SOUTH HADLEY	1,448	3,935	0.32	16,988	5,384
SOUTHAMPTON	764	849	0.30	5,288	1,613
SOUTHBOROUGH	742	3,619	0.56	7,768	4,361
SOUTHBRIDGE	0	0	0.40	17,000	6,800
SOUTHWICK	692	2,895	0.45	8,000	3,588

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SPENCER	1,450	5,244	0.55	12,218	6,694
SPRINGFIELD	8,127	44,631	0.35	150,000	52,758
STERLING	784	2,648	0.51	6,733	3,432
STOCKBRIDGE	913	1,450	0.99	2,397	2,363
STONEHAM	1,942	9,545	0.52	22,238	11,487
STOUGHTON	1,211	8,250	0.35	27,147	9,461
STOW	0	0	0.40	5,626	2,250
STURBRIDGE	346	265	0.08	7,828	611
SUDBURY	865	1,383	0.14	16,532	2,248
SUNDERLAND	234	609	0.29	2,870	843
SUTTON	533	1,186	0.21	8,100	1,719
SWAMPSCOTT	1,426	5,344	0.47	14,500	6,770
SWANSEA	1,153	6,670	0.51	15,373	7,823
TAUNTON	4,055	12,447	0.32	51,624	16,501
TEMPLETON	329	0	0.40	6,600	2,640
TEWKSBURY	1,852	10,800	0.44	29,077	12,652
TISBURY	416	1,499	0.62	3,102	1,915
TOLLAND	42	431	1.45	326	473
TOPSFIELD	957	2,041	0.52	5,728	2,998
TOWNSEND	912	4,800	0.63	9,054	5,712
TRURO	252	1,914	1.19	1,821	2,166
TYNGSBOROUGH	1,081	4,708	0.61	9,500	5,789
TYRINGHAM	110	1,774	5.19	363	1,884
UPTON	287	1,625	0.38	5,024	1,912
UXBRIDGE	253	0	0.40	11,393	4,557
WAKEFIELD	2,228	9,891	0.49	24,741	12,119
WALES	0	0	0.40	1,676	670
WALPOLE	2,091	6,911	0.43	21,086	9,001
WALTHAM	3,678	23,289	0.46	59,251	26,966
WARE	0	0	0.40	10,254	4,102
WAREHAM	244	9,353	0.41	23,200	9,597
WARREN	0	0	0.40	4,850	1,940
WARWICK	79	160	0.37	650	239
WASHINGTON	134	114	0.40	615	248
WATERTOWN	2,678	15,107	0.53	33,284	17,784
WAYLAND	2,029	2,411	0.34	13,091	4,440
WEBSTER	722	0	0.40	15,500	6,200
WELLESLEY	3,491	8,384	0.45	26,215	11,875
WELLFLEET	508	2,334	0.89	3,200	2,842
WENDELL	99	240	0.35	981	339
WENHAM	0	0	0.40	4,253	1,701
WEST BOYLSTON	734	1,741	0.36	6,823	2,475
WEST BRIDGEWATER	323	0	0.40	6,481	2,592
WEST BROOKFIELD	0	0	0.40	3,707	1,483
WEST NEWBURY	471	1,702	0.60	3,599	2,173
WEST SPRINGFIELD	1,543	7,189	0.32	27,705	8,732
WEST STOCKBRIDGE	267	757	0.68	1,502	1,024

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WEST TISBURY	551	1,639	1.23	1,774	2,190
WESTBOROUGH	1,048	5,300	0.45	14,260	6,348
WESTFIELD	3,205	11,407	0.37	39,310	14,611
WESTFORD	2,678	8,200	0.57	19,100	10,878
WESTHAMPTON	129	397	0.38	1,374	526
WESTMINSTER	434	0	0.40	6,477	2,591
WESTON	1,430	2,696	0.39	10,660	4,126
WESTPORT	622	1,782	0.17	13,816	2,404
WESTWOOD	1,505	5,982	0.58	12,940	7,487
WEYMOUTH	3,134	19,032	0.41	54,207	22,166
WHATELY	129	139	0.19	1,430	268
WHITMAN	0	0	0.40	13,416	5,366
WILBRAHAM	1,593	3,399	0.40	12,635	4,992
WILLIAMSBURG	296	869	0.46	2,559	1,165
WILLIAMSTOWN	468	586	0.13	7,888	1,054
WILMINGTON	1,531	9,766	0.54	21,094	11,297
WINCHENDON	575	2,243	0.29	9,654	2,818
WINCHESTER	1,961	11,592	0.68	20,044	13,553
WINDSOR	157	287	0.58	770	444
WINTHROP	209	2,502	0.15	17,628	2,711
WOBURN	0	0	0.40	35,917	14,367
WORCESTER	10,957	26,309	0.22	169,759	37,266
WORTHINGTON	162	281	0.35	1,248	443
WRENTHAM	837	3,565	0.43	10,200	4,402
YARMOUTH	2,763	7,478	0.48	21,430	10,241
TOTALS:	**351**	**438,262**	**2,018,753**	**6,198,626**	**2,706,692**

* Generation for non-reporting municipalities is based on a default estimated generation rate. The default estimated generation rate is 0.40 tons/person/year, which does not include composted waste.

APPENDIX C
Municipal Recycling Tonnages

1999 Municipal Recycling, Tons collected for Major Material Types

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Steel/Tin Aluminum	Steel/Tin Cans	Cardboard	Textiles
ABINGTON				237		104		896				
ACTON		400		480		300	900					
ACUSHNET		12		106				160				
ADAMS				513				1,689				
AGAWAM		247		611		190		1,436				
ALFORD				21				51				
AMESBURY	2		61				242		4	12	2	
AMHERST		162		604				1,732				27
ANDOVER	47	353	423			15		2,357		8		38
ARLINGTON				907				3,885				
ASHBURNHAM		8		122				262	2			
ASHBY	6	325	13					39	18			
ASHFIELD	6	20		59				150				13
ASHLAND				292				1,135				
ATHOL												
ATTLEBORO		372		824				1,788				39
AUBURN												
AVON				59				249				
AYER	20	100	50				50	60		10	80	8
BARNSTABLE	52	882	303			45	944	208	9	50	253	2,031
BARRE		16		19			69				1	
BECKET		28		40				82				
BEDFORD				286				1,108				
BELCHERTOWN	0	61		95				259			92	
BELLINGHAM	6	150	75			50	425	150	20	30	100	
BELMONT	0	19		558		21	2,207					
BERKLEY	19		41	126	48		99	48			70	17
BERLIN												
BERNARDSTON	9	75		45				123				
BEVERLY				610		192		2,388				
BILLERICA				447		120		1,509			8	5
BLACKSTONE		6		155				311				
BLANDFORD		20		184				24				
BOLTON	33	68	59			2	168	83	3	31	74	1
BOSTON	34	2,228		3,825		5,578		18,025				872
BOURNE	65	1,320	145				688	22	20	66	168	35
BOXBOROUGH	2		32				127	104				
BOXFORD	1	59		289				762			44	2
BOYLSTON												
BRAINTREE	0	873	3	338			1,365	102		2		3
BREWSTER	24		155			276	397	130		29	41	41
BRIDGEWATER												
BRIMFIELD												
BROCKTON				260		1,612		2,107				
BROOKFIELD	13	100	24			5	75	47	3	10	25	8

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Steel/Tin Aluminum	Steel/Tin Cans	Cardboard	Textiles
BROOKLINE	0			857				3,617				
BUCKLAND	8			38				101				
BURLINGTON				475		20	1,425					
CAMBRIDGE		2		1,665		112		6,144				3
CANTON		10		271		263	1,098					48
CARLISLE	25	112	94			6	306	178	1	13	123	
CARVER												
CHARLEMONT	4			25				60				
CHARLTON				19			28					
CHATHAM	20	219	217			17	394	142		25	201	39
CHELMSFORD		87		810				2,675				15
CHELSEA						5		482				
CHESHIRE		51		56		12		141				
CHESTER												
CHESTERFIELD		5		18				62				
CHICOPEE				806				2,526				
CHILMARK	8	40	34			12	52	26	1	4	28	4
CLARKSBURG												
CLINTON												
COHASSET	20	112	117			24	659		2	19	172	50
COLRAIN	4	56		38				75			15	
CONCORD		40		339				1,259			30	3
CONWAY	9			50		2		132				
CUMMINGTON	3	10		21				59				4
DALTON												
DANVERS				267		216		1,295				9
DARTMOUTH	21	287	158				730	55		59	8	14
DEDHAM				361				1,305				
DEERFIELD	17	240		77				302				
DENNIS												
DIGHTON		40		126		140	210				60	
DOUGLAS	4		21			101		70		11		7
DOVER	4	142	83					412		16	34	7
DRACUT												
DUDLEY	8	50	32				127			16	25	
DUNSTABLE	10		21			10		110		9	59	2
DUXBURY	33	91	127			102	998		15	13	257	85
EAST BRIDGEWATER				250		8	697					
EAST BROOKFIELD		20		39		20		105				
EAST LONGMEADOW		13		299				1,006				4
EASTHAM	7	129	100				203		10			36
EASTHAMPTON				170		100		527				
EASTON												
EDGARTOWN	36	188	160			57	243	121	3	16	131	19
EGREMONT				91				188				22
ERVING				37				96				
ESSEX	6	56	37					168		61		24
EVERETT		2		200		161		785			2	1

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Steel/Tin Aluminum	Steel/Tin Cans	Cardboard	Textiles
FAIRHAVEN		27		250		14		473				9
FALL RIVER				466		435		688				
FALMOUTH		1,120		685				1,930				22
FITCHBURG				335		556	48	737	1		27	5
FLORIDA				13				26				
FOXBOROUGH												
FRAMINGHAM	3		28	869		200		3,470		7		4
FRANKLIN		169	8	569		100	58	1,923			30	
FREETOWN	20	37	11				42	34	0	10	33	10
GARDNER		775		313				866			41	
GAY HEAD	2	13	11	1		4	16	8		0	9	1
GEORGETOWN												
GILL				34				101				
GLOUCESTER		48		508		162		1,614				122
GOSHEN	2	7		12				37				4
GOSNOLD	2	9	3								4	
GRAFTON	26		9				273			9		
GRANBY		220		110				343				141
GRANVILLE		18		29				82				
GREAT BARRINGTON		67		126				403				
GREENFIELD		251		387		15		1,393			216	
GROTON	40	50	116			16		650	4	15	132	24
GROVELAND												
HADLEY		38		98			496				91	7
HALIFAX	28	61	53			6	194	2		24	40	1
HAMILTON		33		133			451					
HAMPDEN	4	36	14			23	82	29		7	30	
HANCOCK				17		8		42				
HANOVER	23	465	76			15	744	45		18	172	85
HANSON												
HARDWICK	10		19			8		129		15	28	6
HARVARD	10	108	94				232	163	2	16	61	
HARWICH	20	538	139	14		48	492	11		37	130	59
HATFIELD	6	24		42				159				15
HAVERHILL	16	245	102			106		3,129		21		40
HAWLEY												
HEATH						20		39				
HINGHAM	16		400			600	1,430			50	103	84
HINSDALE		17		36				76				
HOLBROOK				136		76		534				
HOLDEN	19			226		11		622	1			1
HOLLAND												
HOLLISTON		52		322				1,198			5	
HOLYOKE		252		304				1,291			15	2
HOPEDALE		215		159				482				24
HOPKINTON	20		257			3	110	29		5	980	
HUBBARDSTON		50		36		50		72				
HUDSON												

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Aluminum	Steel/Tin Cans	Cardboard	Textiles
HULL			12			16	76				14	
HUNTINGTON	4	19		32				118				13
IPSWICH		227		236		2		856			21	10
KINGSTON		280		82			373				86	
LAKEVILLE	45		63			134	216	59		35	135	65
LANCASTER	34	450	57			262	54	188	47	112	156	29
LANESBOROUGH				19				47				
LAWRENCE		491		245				843				25
LEE				199				735				
LEICESTER	51		38	434				132	87	59	77	6
LENOX				75				425				
LEOMINSTER		416		618			47	1,268			16	60
LEVERETT		10		51				142				2
LEXINGTON				780				3,486				
LEYDEN												
LINCOLN	31	111	45			15		409		46		
LITTLETON	18	206	77			12		512	2			18
LONGMEADOW		108		350				1,418	1			3
LOWELL				928		370		2,589				48
LUDLOW		162		369				978				
LUNENBURG												
LYNN				68				1,348				
LYNNFIELD		23		190				830				
MALDEN				46		400	1,457					7
MANCHESTER		132		157				526				8
MANSFIELD	8	153	30	320		56	205	1,249			6	17
MARBLEHEAD		2,800		338			1,735	401			1,240	
MARION		330		44			73			12		
MARLBOROUGH		190		69		212	197	2			55	
MARSHFIELD		235		480		44		1,243				
MASHPEE	16	333	114				348	12		13		
MATTAPOISETT				152		242	236					4
MAYNARD		83		274		16		965				13
MEDFIELD	35		153			161	682	254		15		
MEDFORD		41		538		106		2,547				
MEDWAY		40		258		62		1,091			39	
MELROSE				311		160	1,371	65			30	18
MENDON		133		114				290				
MERRIMAC	11		92				358		6	25	18	2
METHUEN		88		278		68		1,709				29
MIDDLEBOROUGH	38	960	101			46	445			52	19	4
MIDDLEFIELD	2	5		10				28				4
MIDDLETON		156		47				308				25
MILFORD		197		515		301		1,215				15
MILLBURY	11	320	60	195			235	131		35	94	173
MILLIS		42		66				278				
MILLVILLE												
MILTON		100		621		145	2,625					60

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Aluminum	Steel/Tin Cans	Cardboard	Textiles
MONROE												
MONSON				125				369				
MONTAGUE		54		176		54		567				
MONTEREY	3	41		31				254				
MONTGOMERY												
MOUNT WASHINGTO				21				23				
NAHANT				70			239					
NANTUCKET	58	3,435					102	561		16	773	30
NATICK		270		566		566		2,432				
NEEDHAM		416		749				3,091			354	170
NEW ASHFORD				7				17				
NEW BEDFORD	82	316	159			118	1,205	33		125	192	28
NEW BRAINTREE												
NEW MARLBOROUGH												
NEW SALEM	3			21		5		69				
NEWBURY	25	147	90			14		258		22	150	2
NEWBURYPORT	28	26	270				1,058		68	74	193	18
NEWTON		65		2,435		141		9,783				398
NORFOLK	25		95			4	564	6	2	154	104	24
NORTH ADAMS		11		765		6		1,924				
NORTH ANDOVER	29		195			73		1,480	6	37	62	2
NORTH ATTLEBOROU				3,240				1,857				
NORTH BROOKFIELD	14	62	47				80	144		18	60	13
NORTH READING	27		90				570			28	85	
NORTHAMPTON				767		996					1,701	47
NORTHBOROUGH	45		167					905		149		
NORTHBRIDGE				56				325				
NORTHFIELD	11	120		64				192				
NORTON												
NORWELL		52		204				766				
NORWOOD		32		393				1,694				1
OAK BLUFFS				165			194	12		280	195	
OAKHAM												
ORANGE	7	660		168				362			232	
ORLEANS	25	188	149			40	368		20	19	38	22
OTIS		67		57				113				
OXFORD												
PALMER												
PAXTON				88				276				
PEABODY		284		644		68	2,127	72				
PELHAM				19				55				
PEMBROKE	27	150	46				349	89	23		108	28
PEPPERELL	20	150	90	150		20	130		9	30	125	
PERU				15				29				
PETERSHAM				510			46				6	
PHILLIPSTON												
PITTSFIELD												
PLAINFIELD	2	6		16				38				

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Aluminum	Steel/Tin Cans	Cardboard	Textiles
PLAINVILLE		40		138				432				
PLYMOUTH		825		238			785			58	381	595
PLYMPTON												
PRINCETON												
PROVINCETOWN	15	39	217			31	149	72		24	278	
QUINCY			696	580		20		3,000	128	128		
RANDOLPH				507		315		1,209				
RAYNHAM	17	258	32			238	201			18	75	7
READING				342		33		1,635				6
REHOBOTH	21	78	60			9	138			8	69	11
REVERE		198		215		513	998					25
RICHMOND		23				23						
ROCHESTER		22		63			143			8	6	5
ROCKLAND		32		195		36	609				1	3
ROCKPORT	35	180	160					675		80	60	60
ROWE	2	16		10				28				
ROWLEY												
ROYALSTON		93		31				48				5
RUSSELL				25		8		78				
RUTLAND												
SALEM		260		553		400		2,119				32
SALISBURY	12	103	98	4		75	385		6	27	3	10
SANDISFIELD												
SANDWICH	41		152			315		747	4	37	132	60
SAUGUS				330				1,382				
SAVOY				12				20				
SCITUATE		200		206		100		948				50
SEEKONK	36		176			98		1,171	67			70
SHARON		17				6		1,342				18
SHEFFIELD	11	138		104		138		306				1
SHELBURNE	5	8		39				121				2
SHERBORN		74		100		17		342				3
SHIRLEY	13	15	40			14	86	56	1	16	11	
SHREWSBURY				490				1,415			51	
SHUTESBURY		3		53				145				
SOMERSET						195		1,763				
SOMERVILLE				1,014				3,424				
SOUTH HADLEY		56		341				1,051				
SOUTHAMPTON		300		104				360				
SOUTHBOROUGH		225		113			359					45
SOUTHBRIDGE												
SOUTHWICK		238		119				336				
SPENCER	50	400	100			100		400		300		100
SPRINGFIELD		1,306		1,571		550		4,700				
STERLING		151		117		22		361	4		124	5
STOCKBRIDGE	10			230				673				
STONEHAM		120		362		100		1,280				80
STOUGHTON		14		320		130	741					5

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Aluminum	Steel/Tin Cans	Cardboard	Textiles
STOW												
STURBRIDGE	11		29			9	127	88	4	17	57	5
SUDBURY	12	123	82			19	318	217			90	4
SUNDERLAND				62				172				
SUTTON	11	120	27			60	125			11	180	
SWAMPSCOTT		70		272				1,083				
SWANSEA				377				776				
TAUNTON				1,211		243		2,600				
TEMPLETON				117				212				
TEWKSBURY	12	275	61	187		181	411	706	3	16		
TISBURY		76		134			167	5			34	
TOLLAND	1			13				28				
TOPSFIELD	4	24		159				738			30	2
TOWNSEND	16	252	59	16		72	167	111	4	18	70	22
TRURO	5	72	51				70			11	17	16
TYNGSBOROUGH				293				788				
TYRINGHAM		5	4	4				98				
UPTON		102	60				115					10
UXBRIDGE				32		3	109			3	106	
WAKEFIELD				434		180		1,614				
WALES												
WALPOLE				463				1,628				
WALTHAM			734			275		2,669				
WARE												
WAREHAM				63			158	24				
WARREN												
WARWICK	3	21		15				40				
WASHINGTON		75		15				36				7
WATERTOWN		36		512		79	2,038	13				
WAYLAND	3	264	132			70	1,105			64	249	142
WEBSTER	12	69	77		9	24	322	33	77	36	62	
WELLESLEY	64	237	348	39		27	2,206	26	4	52	419	70
WELLFLEET	14	184	130			8	112	5		10	40	5
WENDELL	3	24		20		8		44				
WENHAM												
WEST BOYLSTON		179		146				409				
WEST BRIDGEWATER				60			200				63	
WEST BROOKFIELD												
WEST NEWBURY	16	80	89				260		4	23		
WEST SPRINGFIELD				374				1,169				
WEST STOCKBRIDGE	12	52		37				166				
WEST TISBURY	20	107	90			32	137	69	2	9	74	11
WESTBOROUGH	33	200	91				517	19	1	29	83	75
WESTFIELD		390		697				2,117				
WESTFORD				478		31		2,157				12
WESTHAMPTON	3	15		21				81				10
WESTMINSTER		166		65				188	0		12	2
WESTON		148	134	41		11	750	218				50

Municipality	Plastics	Scrap Metal	Glass	Commingled Containers	Aseptic	White Goods	Newspaper	Mixed Paper	Steel/Tin Aluminum	Steel/Tin Cans	Cardboard	Textiles
WESTPORT	16	159	25	96			245			12	46	22
WESTWOOD		85		257		67		1,096				
WEYMOUTH		120		262		94	2,658					
WHATELY	6			30				93				
WHITMAN												
WILBRAHAM	36	237		226				1,093				
WILLIAMSBURG	9	41		53				179				14
WILLIAMSTOWN				130				338				
WILMINGTON				274		104	1,150					3
WINCHENDON	18	221	69			6	93	99	2	21	46	
WINCHESTER	44		256				1,110	440		36	75	
WINDSOR		80		26				52				
WINTHROP							209					
WOBURN												
WORCESTER		470		2,641		470		7,369				7
WORTHINGTON	4	18		31				99				11
WRENTHAM				194		31		591			21	
YARMOUTH		1,184		306			856				233	185
	2,238	**41,656**	**10,445**	**66,184**	**57**	**22,898**	**57,687**	**210,458**	**701**	**3,172**	**13,836**	**7,519**

APPENDIX D

Available Municipal Recycling Access by Material

Recycling Collection Method and Materials Accepted

Municipality	Collection Method*	Newspaper	Cardboard	Mixed Paper	Wax/Aseptic Cartons	Glass	#1 (PET) plastic	#2 (HDPE) plastic	Other plastics	Aluminum cans/foil	Steel/Tin cans	Aerosol cans	White Goods	Scrap Metal	Motor oil	Spent anti-freeze	Auto batteries	Auto tires	Leaves/Yard Waste	Christmas Trees	C & D debris	Surplus paint	Swap Shop	Textiles	Other Material
Abington	Curb	X	X	X	X	X	X	X		X	X		X						X						
Acton	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	
Acushnet	Curb	X	X	X		X	X	X		X	X	X	X	X					X	X				X	
Adams	Drop	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X		X			X
Agawam	Curb	X	X	X		X	X	X	X	X	X		X		X		X	X	X	X					
Alford	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X				X			X				
Amesbury	Curb	X	X	X		X	X	X		X	X		X		X		X		X	X		X		X	
Amherst	Curb		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X
Andover	Curb	X	X	X		X	X	X	X	X	X			X	X				X						
Arlington	Curb	X	X	X	X	X	X	X	X	X	X		X		X	X	X		X	X		X			
Ashburnham	Sub	X	X	X		X	X	X	X	X	X	X	X	X							X				
Ashby	Curb	X				X	X	X	X	X	X		X	X	X			X							
Ashfield	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X			X	X	X	X	X	X	X	
Ashland	Curb	X	X	X	X	X	X	X	X	X	X				X				X	X		X			
Athol	Sub	X	X	X	X	X	X	X	X	X	X		X	X										X	
Attleboro	Curb	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	
Auburn	Curb	X	X	X	X	X	X	X	X	X	X		X					X	X	X					
Avon	Curb	X	X	X		X	X	X		X	X		X	X					X	X				X	
Ayer	Drop	X	X	X	X	X				X	X	X	X	X	X		X	X	X	X		X		X	
Barnstable	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Barre	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X				X	
Becket	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X							
Bedford	Curb	X	X	X		X	X	X	X	X	X		X	X		X			X			X			
Belchertown	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X		X	
Bellingham	Curb	X	X	X	X	X	X		X	X			X				X	X	X	X			X	X	
Belmont	Curb	X		X		X	X	X		X	X				X	X	X		X			X			
Berkley	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Berlin	Drop	X	X	X		X	X	X	X	X	X	X	X	X			X	X		X			X	X	X
Bernardston	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X		X	
Beverly	Curb	X	X	X		X	X	X		X	X		X							X				X	X
Billerica	Curb	X	X	X		X	X	X	X	X			X		X		X	X	X						
Blackstone	Curb	X	X	X		X	X	X		X	X			X					X	X				X	
Blandford	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X			
Bolton	Drop	X	X	X		X	X	X	X	X	X		X	X	X			X							
Boston	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		
Bourne	Curb	X	X	X		X				X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Boxborough	Drop	X	X	X		X	X	X	X	X	X			X				X				X			
Boxford	Curb	X	X	X		X	X	X	X	X	X		X	X	X		X	X		X	X			X	X
Boylston	Sub																								
Braintree	Curb	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	
Brewster	Drop	X	X	X		X	X	X		X	X		X	X	X		X	X	X	X		X	X	X	
Bridgewater	Drop	X		X		X	X	X	X	X	X		X	X	X		X	X	X				X	X	
Brimfield	Drop	X	X	X	X	X	X	X	X	X	X		X	X											
Brockton	Curb	X	X	X		X	X	X		X	X		X	X					X	X				X	
Brookfield	Drop	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X		X	X	X	X	
Brookline	Curb	X	X	X		X	X	X		X	X	X	X	X					X	X					
Buckland	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X		X	
Burlington	Curb	X	X	X		X	X	X	X	X	X		X		X	X	X	X	X			X			
Cambridge	Curb	X	X	X	X	X	X	X	X	X	X		X		X				X	X				X	
Canton	Curb	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X		X		X	
Carlisle	Drop	X	X	X		X	X	X	X	X	X		X	X	X		X		X	X		X			

Municipality	Collection Method*	Newspaper	Cardboard	Mixed Paper	Wax/Aseptic Cartons	Glass	#1 (PET) plastic	#2 (HDPE) plastic	Other plastics	Aluminum cans/foil	Steel/Tin cans	Aerosol cans	White Goods	Scrap Metal	Motor oil	Spent anti-freeze	Auto batteries	Auto tires	Leaves/Yard Waste	Christmas Trees	C & D debris	Surplus paint	Swap Shop	Textiles	Other Material
Carver	Drop	X	X			X	X	X		X	X		X	X				X	X	X				X	
Charlemont	Drop	X	X	X		X	X	X	X	X	X														
Charlton	Sub																								
Chatham	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Chelmsford	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X		X		X	
Chelsea	Curb	X	X	X		X				X	X	X	X	X					X	X				X	
Cheshire	Drop	X				X							X	X					X	X					
Chester	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X						X	
Chesterfield	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X			X	X	X	X	
Chicopee	Curb	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X					
Chilmark	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Clarksburg	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X	X		X				
Clinton	Drop	X		X		X	X	X	X	X	X		X	X			X	X	X						
Cohasset	Drop	X	X	X		X	X	X			X	X	X	X	X	X	X	X	X			X	X	X	
Colrain	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				X	X	X	
Concord	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X				X	X	X		X		
Conway	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				X	X	X	
Cummington	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X			X	X		X	
Dalton	Drop	X	X	X	X	X	X	X	X	X		X	X						X	X	X				
Danvers	Curb	X	X	X		X	X	X		X	X		X	X										X	
Dartmouth	Curb	X		X		X		X		X	X	X	X	X	X			X	X	X		X		X	
Dedham	Curb	X	X	X		X			X	X	X		X		X	X	X	X	X	X		X			
Deerfield	Drop	X	X	X	X	X	X	X	X	X	X		X	X			X		X	X					
Dennis	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dighton	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X					
Douglas	Drop	X	X			X	X	X		X	X			X			X	X		X				X	
Dover	Drop	X	X	X		X	X		X	X	X	X		X	X		X		X	X		X	X	X	
Dracut	Curb	X	X	X	X	X				X	X	X	X	X	X			X	X	X		X		X	
Dudley	Drop	X	X	X		X		X		X	X		X	X	X		X	X	X	X	X		X		
Dunstable	Drop	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X						X	
Duxbury	Drop	X	X	X		X	X	X		X	X		X	X									X	X	
East Bridgewater	Curb	X	X	X		X	X	X		X	X		X	X				X							
East Brookfield	Curb	X	X	X	X	X	X	X	X	X	X		X	X											
East Longmeadow	Curb	X	X	X		X	X	X		X	X	X		X	X		X		X	X					
Eastham	Drop	X				X	X	X		X	X		X	X	X		X	X	X	X	X		X	X	
Easthampton	Sub	X	X	X		X	X	X	X	X	X		X	X	X		X		X	X					X
Easton	Drop	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X			X	X		
Edgartown	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Egremont	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X									X		
Erving	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			
Essex	Drop	X		X		X	X			X		X	X	X	X	X	X			X		X	X	X	
Everett	Curb	X		X		X	X	X	X	X	X		X						X					X	
Fairhaven	Curb	X		X		X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X		
Fall River	Curb	X				X	X	X		X	X		X		X			X	X	X					
Falmouth	Curb	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X	X	X		X	X	X
Fitchburg	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	
Florida	Drop	X	X	X	X	X				X	X	X	X	X					X	X				X	
Foxborough	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X			X	X	X					
Framingham	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	
Franklin	Curb	X	X	X	X	X	X	X	X	X	X			X			X	X	X	X	X	X	X	X	
Freetown	Drop	X	X	X	X	X	X	X	X	X	X			X	X		X	X	X	X			X	X	
Gardner	Curb	X	X	X		X	X	X	X	X	X				X		X	X	X	X	X			X	
Gay Head	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Georgetown	Drop	X				X				X	X			X					X	X					
Gill	Curb	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	
Gloucester	Curb	X	X	X		X	X	X		X	X	X	X		X		X	X	X	X		X		X	
Goshen	Drop	X	X	X	X	X	X	X	X				X	X				X			X	X		X	

Municipality	Collection Method*	Newspaper	Cardboard	Mixed Paper	Wax/Aseptic Cartons	Glass	#1 (PET) plastic	#2 (HDPE) plastic	Other plastics	Aluminum cans/foil	Steel/Tin cans	Aerosol cans	White Goods	Scrap Metal	Motor oil	Spent anti-freeze	Auto batteries	Auto tires	Leaves/Yard Waste	Christmas Trees	C & D debris	Surplus paint	Swap Shop	Textiles	Other Material
Gosnold	Curb	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X							
Grafton	Drop	X	X	X		X		X			X	X			X				X						
Granby	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Granville	Drop	X	X	X	X	X	X	X	X	X	X		X	X											
Great Barrington	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X			X						
Greenfield	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Groton	Drop	X	X	X	X	X	X	X		X	X	X	X	X					X	X				X	
Groveland	Curb	X	X	X		X	X	X		X	X		X		X	X	X	X		X					
Hadley	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Halifax	Curb	X	X	X		X	X	X		X	X	X		X	X		X	X	X	X	X	X	X	X	
Hamilton	Curb	X		X		X	X	X	X	X	X			X					X	X					
Hampden	Drop	X	X	X		X		X		X	X		X	X					X	X					
Hancock	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X				X		X					
Hanover	Drop	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		X	
Hanson	Drop	X			X	X	X	X		X	X		X	X	X		X		X					X	
Hardwick	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	X
Harvard	Drop	X	X	X		X	X	X	X	X	X	X	X	X					X						
Harwich	Drop	X	X	X		X	X			X	X	X	X	X					X	X			X	X	
Hatfield	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X			X	X	X	X	X	X	X	
Haverhill	Curb	X	X	X		X		X		X	X		X	X	X	X		X	X	X		X		X	
Hawley	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X			X	X	X	X	X	X	X	
Heath	Drop	X	X	X	X	X				X	X		X	X				X			X		X		
Hingham	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Hinsdale	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X						
Holbrook	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			
Holden	Sub	X		X		X	X	X		X	X		X	X	X		X	X	X						
Holland	Sub																		X						
Holliston	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X		X	
Holyoke	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X		X			X
Hopedale	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	
Hopkinton	Curb	X	X	X		X	X	X	X	X	X		X	X			X		X					X	
Hubbardston	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X				X	
Hudson	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X						
Hull	Drop	X	X			X	X	X					X		X			X		X					
Huntington	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X			X	X	X	X	
Ipswich	Curb	X	X	X		X	X	X		X	X		X	X					X	X				X	
Kingston	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Lakeville	Drop	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X
Lancaster	Drop	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X	X			X	X	
Lanesborough	Drop	X	X	X	X	X	X	X	X	X	X					X	X					X			
Lawrence	Curb	X	X	X		X	X	X	X	X	X		X						X	X					
Lee	Curb	X	X	X	X	X	X	X	X	X	X									X		X			
Leicester	Drop	X	X	X		X	X	X	X	X	X		X		X		X	X	X						
Lenox	Sub	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Leominster	Curb	X	X	X		X	X	X	X	X	X		X	X	X	X		X	X	X	X	X		X	
Leverett	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X	
Lexington	Curb	X	X	X	X	X	X	X		X	X		X		X	X	X	X	X	X		X		X	
Leyden	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				X			
Lincoln	Drop	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	
Littleton	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X			X	X	X
Longmeadow	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	X
Lowell	Curb	X	X	X		X	X	X		X	X		X			X	X	X	X	X		X		X	
Ludlow	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X		X			
Lunenburg	Sub																								
Lynn	Curb	X	X	X		X	X	X		X	X								X	X					
Lynnfield	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X			X	
Malden	Curb	X		X		X	X	X		X	X		X						X	X					

Municipality	Collection Method*	Newspaper	Cardboard	Mixed Paper	Wax/Aseptic Cartons	Glass	#1 (PET) plastic	#2 (HDPE) plastic	Other plastics	Aluminum cans/foil	Steel/Tin cans	Aerosol cans	White Goods	Scrap Metal	Motor oil	Spent anti-freeze	Auto batteries	Auto tires	Leaves/Yard Waste	Christmas Trees	C & D debris	Surplus paint	Swap Shop	Textiles	Other Material
Manchester	Curb	X	X	X		X	X	X	X		X		X	X	X	X	X		X	X				X	X
Mansfield	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X			X	X	
Marblehead	Curb	X	X	X		X	X	X		X	X		X	X	X		X	X	X	X			X	X	
Marion	Curb	X				X	X	X			X		X	X					X	X					
Marlborough	Drop	X	X	X		X	X	X		X	X		X	X	X		X	X	X	X		X			
Marshfield	Curb	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X		X			
Mashpee	Drop	X				X	X	X		X	X		X	X	X	X	X	X	X	X	X			X	X
Mattapoisett	Curb	X		X		X	X	X		X	X		X	X	X		X	X	X	X		X	X	X	
Maynard	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X		X	
Medfield	Drop	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X	X			X		
Medford	Curb	X	X	X		X	X	X	X	X	X		X	X					X	X					
Medway	Curb	X	X	X	X	X	X	X	X	X	X		X	X			X		X	X			X		
Melrose	Curb	X	X	X		X	X	X		X	X		X	X	X		X	X	X	X		X		X	
Mendon	Curb	X	X	X		X	X	X	X	X	X			X						X					
Merrimac	Curb	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X	X		X		X	
Methuen	Curb	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Middleborough	Curb	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X	X		X		X	
Middlefield	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X			X	X	X	X	
Middleton	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X				X	X	X		X	X	
Milford	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	
Millbury	Drop	X	X	X		X	X	X		X	X		X	X	X		X		X	X				X	
Millis	Drop	X	X	X		X	X	X	X	X	X	X	X	X					X	X			X	X	
Millville	Curb	X	X	X		X	X	X	X	X	X		X	X					X	X					
Milton	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X				X	
Monroe	Curb	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X		X		X	
Monson	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X				X							
Montague	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X				X
Monterey	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				X			
Montgomery	Curb	X	X	X	X	X	X	X	X	X	X	X													
Mount Washington	Drop	X	X	X	X	X	X	X	X	X	X			X											
Nahant	Curb	X	X	X		X	X	X		X	X		X	X	X				X	X					
Nantucket	Drop	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X			
Natick	Curb	X	X	X		X	X	X		X	X		X	X	X		X		X	X					
Needham	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	
New Ashford	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X		X
New Bedford	Curb	X	X	X		X	X	X	X	X	X		X	X	X	X	X		X	X		X		X	
New Braintree	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X				X	X	X	
New Marlborough	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X							
New Salem	Drop	X	X	X	X	X	X	X	X	X	X				X	X						X	X		
Newbury	Drop	X	X	X		X	X	X			X		X	X	X	X	X	X	X	X		X	X	X	
Newburyport	Curb	X	X	X		X	X	X		X	X		X	X	X		X		X	X		X		X	
Newton	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X
Norfolk	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X				X	
North Adams	Drop	X	X	X	X	X	X	X	X	X	X		X	X					X	X	X				
North Andover	Curb	X	X	X		X	X	X		X	X		X		X				X	X					
North Attleborough	Curb	X	X	X		X	X	X	X	X	X		X	X			X	X	X						
North Brookfield	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
North Reading	Drop	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X		X			
Northampton	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X		X	
Northborough	Curb	X	X	X		X	X	X		X	X				X	X		X	X	X		X			
Northbridge	Sub	X	X	X	X	X	X	X	X	X	X		X		X	X			X	X		X			
Northfield	Drop	X	X	X	X	X				X	X		X	X					X	X			X		
Norton	Sub														X	X			X						
Norwell	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X	X			X	X		X			
Norwood	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Oak Bluffs	Drop																								
Oakham	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X			X			X	X

Municipality	Collection Method*	Newspaper	Cardboard	Mixed Paper	Wax/Aseptic Cartons	Glass	#1 (PET) plastic	#2 (HDPE) plastic	Other plastics	Aluminum cans/foil	Steel/Tin cans	Aerosol cans	White Goods	Scrap Metal	Motor oil	Spent anti-freeze	Auto batteries	Auto tires	Leaves/Yard Waste	Christmas Trees	C & D debris	Surplus paint	Swap Shop	Textiles	Other Material
Orange	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Orleans	Drop	X	X	X		X	X	X		X	X		X	X	X		X	X	X			X			
Otis	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X		X		X	X	X		X	X	
Oxford	Sub	X	X	X		X	X	X					X	X	X				X	X				X	
Palmer	Sub	X	X	X	X	X	X	X	X	X	X														
Paxton	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Peabody	Curb	X	X	X	X	X	X	X		X	X		X	X	X		X		X					X	X
Pelham	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	
Pembroke	Drop	X	X	X		X	X	X		X	X		X	X			X	X	X				X	X	X
Pepperell	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X			
Peru	Drop	X	X	X	X	X	X	X	X	X	X				X	X		X							
Petersham	Drop	X	X	X		X				X	X			X											
Phillipston	Drop	X	X	X	X	X	X	X		X	X		X	X											
Pittsfield	Curb	X	X	X	X	X	X	X	X	X	X								X	X					
Plainfield	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X			X	X	X	X	
Plainville	Curb	X	X	X	X	X	X	X	X	X	X		X	X			X	X	X	X					
Plymouth	Drop	X	X	X		X	X	X		X			X	X	X		X	X	X	X	X	X		X	X
Plympton	Drop	X		X		X	X	X	X	X	X	X	X	X				X		X			X	X	
Princeton	Sub																								
Provincetown	Curb	X	X	X		X		X		X	X		X	X	X	X			X						
Quincy	Curb	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X			X
Randolph	Curb	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X	X		X			
Raynham	Drop	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X					X	
Reading	Curb	X	X	X		X	X	X		X	X	X	X		X	X	X	X	X	X		X		X	
Rehoboth	Drop	X	X			X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X
Revere	Curb	X	X	X	X	X	X	X	X	X	X		X	X				X	X	X		X			X
Richmond	Curb	X	X	X	X	X	X	X	X	X	X		X	X				X							
Rochester	Curb	X	X	X		X	X	X												X					
Rockland	Curb	X	X	X		X	X	X		X	X		X	X	X		X	X	X			X			
Rockport	Drop	X	X	X	X	X	X	X		X	X	X		X	X				X	X			X	X	X
Rowe	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X		X
Rowley	Drop	X	X	X		X	X	X		X	X														
Royalston	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	
Russell	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X					
Rutland	Drop																								
Salem	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X		X	
Salisbury	Curb	X		X		X	X	X		X	X		X		X				X	X					
Sandisfield	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X			X				
Sandwich	Drop	X		X		X		X		X	X		X	X	X	X	X	X	X				X		
Saugus	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	
Savoy	Drop																								
Scituate	Drop	X	X	X		X	X	X	X	X			X	X	X	X	X	X	X				X	X	
Seekonk	Curb	X	X	X		X		X		X	X	X	X	X	X	X	X	X	X	X		X		X	
Sharon	Curb	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X		X		X	
Sheffield	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				X		X	
Shelburne	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	
Sherborn	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X										X	
Shirley	Drop	X	X	X		X	X	X	X	X	X	X	X						X						
Shrewsbury	Curb	X	X	X	X	X	X	X	X	X	X	X			X				X					X	
Shutesbury	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X											
Somerset	Curb	X	X	X		X	X	X	X	X	X	X	X	X	X			X	X			X	X	X	
Somerville	Curb	X	X	X		X	X	X	X	X	X	X	X		X			X							
South Hadley	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X			X	X	X		X	X	X	X
Southampton	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X		X	
Southborough	Drop	X				X		X		X	X		X	X					X	X			X	X	
Southbridge	Curb	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X	X	X	X			
Southwick	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X			X			

Municipality	Collection Method*	Newspaper	Cardboard	Mixed Paper	Wax/Aseptic Cartons	Glass	#1 (PET) plastic	#2 (HDPE) plastic	Other plastics	Aluminum cans/foil	Steel/Tin cans	Aerosol cans	White Goods	Scrap Metal	Motor oil	Spent anti-freeze	Auto batteries	Auto tires	Leaves/Yard Waste	Christmas Trees	C & D debris	Surplus paint	Swap Shop	Textiles	Other Material
Spencer	Drop	X	X	X		X	X	X	X	X	X		X	X	X		X	X		X	X		X	X	
Springfield	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	
Sterling	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X
Stockbridge	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X		X	X		X		
Stoneham	Curb	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	
Stoughton	Curb	X				X	X	X		X	X		X	X	X				X	X				X	
Stow	Sub	X	X	X		X	X	X		X	X		X	X											
Sturbridge	Drop	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	
Sudbury	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			X	X	
Sunderland	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X				X			
Sutton	Drop	X	X	X		X	X	X	X		X		X	X	X					X					
Swampscott	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X					
Swansea	Curb	X	X	X		X	X	X		X	X	X	X	X					X	X					
Taunton	Curb	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	
Templeton	Sub	X	X	X		X	X	X	X	X	X		X	X				X	X							
Tewksbury	Curb	X	X	X		X	X	X		X	X		X		X	X	X	X	X	X		X			
Tisbury	Curb	X	X	X		X	X	X	X	X	X		X	X				X	X	X			X	X	
Tolland	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X					X		
Topsfield	Curb	X	X	X		X	X	X	X	X	X							X	X	X			X	X	
Townsend	Drop	X	X	X		X	X	X	X	X	X		X	X	X		X	X	X			X		X	
Truro	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	
Tyngsborough	Curb	X	X	X		X	X	X	X	X	X	X			X	X	X		X			X			
Tyringham	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X									X	X	
Upton	Drop	X				X				X	X		X	X					X					X	
Uxbridge	Sub	X	X	X		X				X	X		X	X			X	X	X	X				X	X
Wakefield	Curb	X	X	X		X	X	X		X	X		X	X	X				X	X					
Wales	Drop	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X	X		X		X	
Walpole	Curb	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X		X		X	
Waltham	Curb	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X		X			
Ware	Drop																								
Wareham	Curb	X				X	X	X	X	X	X		X				X	X	X			X			
Warren	Drop	X	X	X		X	X	X	X	X	X		X	X			X	X	X	X				X	
Warwick	Drop	X	X	X		X	X	X	X	X	X		X	X				X			X		X		
Washington	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X						X	
Watertown	Curb	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X	X	X	X			X	
Wayland	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Webster	Drop	X	X	X	X	X	X			X	X	X	X	X	X		X	X	X	X		X	X	X	
Wellesley	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	
Wellfleet	Drop	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Wendell	Drop	X	X	X	X	X	X	X	X	X	X				X	X						X	X		
Wenham	Curb	X		X		X	X	X	X	X	X			X											
West Boylston	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X	X		X			
West Bridgewater	Drop	X	X			X	X	X	X	X	X		X										X		
West Brookfield	Drop																								
West Newbury	Curb	X		X		X	X			X	X			X						X					
West Springfield	Curb	X	X	X	X	X	X	X	X	X	X		X	X				X	X	X	X				
West Stockbridge	Drop	X	X	X	X	X	X	X	X	X	X		X	X			X	X			X				
West Tisbury	Drop	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Westborough	Drop	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	
Westfield	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X		X
Westford	Curb	X	X	X	X	X	X	X		X	X		X		X	X			X	X				X	
Westhampton	Drop	X	X	X	X	X	X	X	X	X	X		X	X				X			X	X		X	
Westminster	Curb	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	X		X	
Weston	Drop	X	X	X		X	X	X	X	X	X	X	X	X					X						
Westport	Drop	X	X			X	X	X		X	X			X	X		X	X	X	X	X				X	
Westwood	Curb	X	X	X		X	X	X	X	X	X		X	X					X	X					
Weymouth	Curb	X	X	X		X	X	X		X	X		X		X		X	X	X			X			

Municipality	Collection Method*	Newspaper	Cardboard	Mixed Paper	Wax/Aseptic Cartons	Glass	#1 (PET) plastic	#2 (HDPE) plastic	Other plastics	Aluminum cans/foil	Steel/Tin cans	Aerosol cans	White Goods	Scrap Metal	Motor oil	Spent anti-freeze	Auto batteries	Auto tires	Leaves/Yard Waste	Christmas Trees	C & D debris	Surplus paint	Swap Shop	Textiles	Other Material
Whately	Drop	X	X	X	X	X	X	X	X	X	X				X	X	X					X			X
Whitman	Curb	X	X	X		X	X	X	X	X	X		X					X	X						
Wilbraham	Drop	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X			X
Williamsburg	Drop	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X			X	X	X	X	
Williamstown	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X				X	X	X	X	X	X	
Wilmington	Curb	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X			X			
Winchendon	Drop	X	X	X		X	X	X		X	X		X	X	X			X	X			X			
Winchester	Drop	X	X	X		X	X	X		X	X	X	X	X	X		X		X	X	X		X	X	
Windsor	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X			
Winthrop	Curb	X	X	X	X	X	X	X	X	X	X	X		X					X	X					
Woburn	Curb	X	X	X		X	X	X	X	X	X		X				X	X	X	X					
Worcester	Curb	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X		X		X	
Worthington	Drop	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X			X	X	X	X	
Wrentham	Curb	X	X	X	X	X	X	X	X	X	X	X	X					X	X	X					
Yarmouth	Drop	X	X	X		X	X	X		X	X		X	X	X		X	X	X						
# of Municipalities		339	3XX	32X	X64	340	3X7	320	225	329	329	XX9	297	274	220	X29	204	223	257	229	89	X63	X08	X83	38

*Collection Method: Curb - Curbside Collection; Drop- Drop-off Center; Sub - Private Subscription Service

APPENDIX E
Landfill Capacity

*Massachusetts Landfills, Waste Disposed in 1999, Approved Capacity 2001-2010**

Municipality		Disposed '99	Liner	Auth. Date	Exclusive MSW/Non-MSW	Approved Capacity in Tons/Year									
ID	Region	Status	Own	Projected TPY	%MSW	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AMHERST		16,194	Y	11/01/2002	No No	30,888	25,811	0	0	0	0	0	0	0	0
SL0008.002	W	Active	M	30,888	100%										
BARRE		96,575	Y	12/31/2006	Yes No	93,600	93,600	93,600	93,600	93,600	93,600	0	0	0	0
SL0021.002	C	Active	P	93,600	17%										
BOURNE		76,494	Y	06/30/2004	n/a No	146,000	146,000	146,000	72,800	0	0	0	0	0	0
SL0036.004	S	Active	M	146,000	0%										
CHICOPEE		184,729	Y	01/31/2002	No No	182,500	15,500	0	0	0	0	0	0	0	0
SL0061.002	W	Active	P	182,500	100%										
CHILMARK		2,014	N	12/31/2003	n/a No	2,014	2,014	2,014	0	0	0	0	0	0	0
SL0062.001	S	Active	M	2,014	0%										
DARTMOUTH		108,846	Y	12/31/2016	Yes** Yes**	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000	115,000
SL0072.003	S	Active	M	115,000	100%										
FALL RIVER		470,211	Y	12/31/2004	No No	468,000	468,000	468,000	468,000	0	0	0	0	0	0
SL0095.002	S	Active	P	468,000	73%										
GARDNER		63,403	Y	12/31/2005	Yes No	90,900	90,900	90,900	90,900	90,900	0	0	0	0	0
SL0103.002	C	Inactive+	M	90,900	17%										
GRANBY		145,970	Y	01/31/2004	Yes No	146,000	146,000	146,000	12,400	0	0	0	0	0	0
SL0111.001	W	Active	P	146,000	13%										
HULL		683	Y	05/01/2006	Yes Yes	683	683	683	683	683	226	0	0	0	0
SL0142.002	N	Active	M	683	22%										
MIDDLEBOROUGH		9,620	Y	06/30/2001	Yes Yes	4,770	0	0	0	0	0	0	0	0	0
SL0182.002	S	Active	M	9,620	100%										
NANTUCKET		22,550	Y	12/31/2015	Yes Yes	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
SL0197.001	S	Active	M	7,000	100%										

Municipality	Disposed '99	Liner	Auth. Date	Exclusive MSW/Non-MSW	Approved Capacity in Tons/Year									
ID Region	Status	Own	Projected TPY	%MSW	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NEWBURY	4,494	Y	12/31/2013	Yes Yes	4,494	4,494	4,494	4,494	4,494	4,494	4,494	4,494	4,494	4,494
SL0205.002 N	Active	M	4,494	100%										
NORTHAMPTON	32,167	Y	12/31/2007	No No	50,000	50,000	50,000	50,000	50,000	50,000	50,000	0	0	0
SL0214.001 W	Active	M	50,000	100%										
SOUTHBRIDGE	128,972	Y	06/30/2019	Yes No	180,960	180,960	180,960	180,960	180,960	180,960	180,960	180,960	180,960	180,960
SL0278.002 C	Active	M	180,960	14%										
STURBRIDGE	569	Y	12/31/2016	Yes Yes	569	569	569	569	569	569	569	569	569	569
SL0287.001 C	Active	M	569	100%										
TAUNTON	99,844	Y	06/30/2006	Yes No	120,120	120,120	120,120	120,120	120,120	59,566	0	0	0	0
SL0293.002 S	Active	M	120,120	13%										
WARREN	1,010	Y	12/31/2005	Yes Yes	2,000	2,000	2,000	2,000	2,000	0	0	0	0	0
SL0311.001 C	Active	M	2,000	100%										
WAYLAND	2,321	Y	12/31/2005	Yes Yes	2,321	2,321	2,321	2,321	2,321	0	0	0	0	0
SL0315.004 N	Active	M	2,321	100%										
WESTMINSTER	117,127	Y	06/30/2002	No No	156,000	77,359	0	0	0	0	0	0	0	0
SL0332.001 C	Active	M	156,000	100%										
					1,803,819	1,548,330	1,429,661	1,220,847	667,647	511,416	358,023	308,023	308,023	308,023

*** Column Heading Definitions**

Region - (C)entral, (N)ortheast, (S)outheast, (W)estern
Status - Active, currently operating; Inactive, not operating not capped; Closed not operating and capped.
Own - ownership of the landfill is either (M)unicipal or (P)rivate
Exclusive MSW / NonMSW - Aeeepts MSW exclusively from the municipality that the landfill is located in (Yes), accepts MSW from any source (No).
Liner - landfill operates a lined eell (Yes), does not operate a lined cell (No)
1999 Disposed - tons of waste landfilled in 1999
Authorization Date - estimated date to cease landfilling under current authorization, based on a permit, consent order, or remaining capacity.
Projected TPY - annual tonnage (Tons Per Year) a landfill can dispose of based on a permit, consent order, or historic precedent.
Percent MSW - percent of annual tonnage that can be used for MSW disposal based on permit, consent order, or historic precedent.
Approved Capacity 2001-2010 - estimated future capacity for each landfill as a function of Projected TPY and Authorization Date.

**** Crapo Hill Landfill In Dartmouth serves only the Town of Dartmouth and the City of New Bedford.**
+ Gardner is scheduled to re-open as a residual landfill

APPENDIX F

Combustion Capacity

Massachusetts Combustion Facilities

1999 Waste Accepted and Projected Capacity (per year for years 2001-2010) in Tons

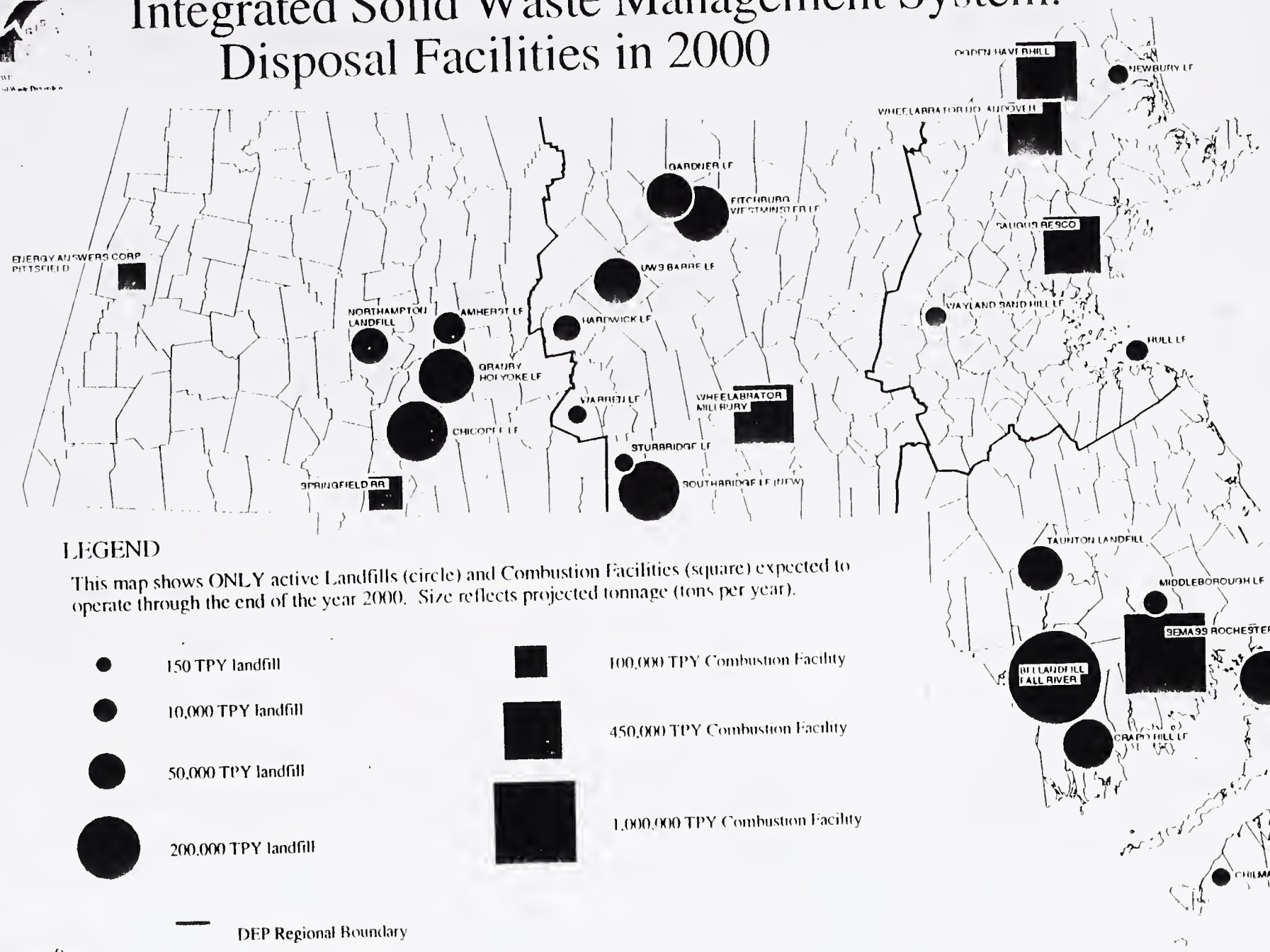
ID	Type[1]	Municipality	Facility Name	Status	Projected Waste Accepted[2]	Waste Accepted	Bypass	Pre-burn metal recovery	Pre-burn nonmetal recovery	Burned[2]	Post-burn recovery
RR0005.005	MB	AGAWAM	Pioneer Valley Resource Recovery	Active	122,378	125,920	0	0	0	125,919	3,541
RR0128.008	MB	HAVERHILL	Ogden Martin Systems/Haverhill	Active	526,102	554,627	424	183	0	551,062	24,960
RR0186.005	MB	MILLBURY	Wheelabrator Millbury	Active	450,364	465,620	0	49	0	465,771	15,407
RR0210.001	MB	NORTH ANDOVER	Massachusetts Refusetech Inc	Active	395,165	408,337	0	0	0	407,230	12,065
RR0236.005	MB	PITTSFIELD	Pittsfield Resource Recovery	Active	76,795	78,280	1,052	324	109	76,795	0
RR0250.002	RD	ROCHESTER	SEMASS Resource Recovery	Active	958,395	993,569	5,755	20,994	0	978,602	20,207
RR0262.006	MB	SAUGUS	Wheelabrator RESCO	Active	411,522	428,873	0	0	0	426,593	15,071
				TOTALS:	**2,940,721**	**3,055,226**	**7,231**	**21,550**	**109**	**3,031,972**	**91,251**

[1]RD- Refuse Derived Fuel, MB- Mass Burn

[2]Projected Waste Accepted is Burned minus Post-burn recovery

APPENDIX G:

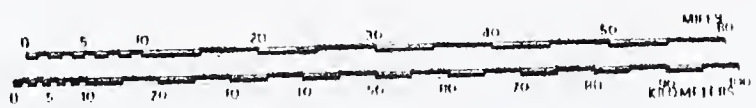
Integrated Solid Waste Management System: Disposal Facilities in 2000



LEGEND

This map shows ONLY active Landfills (circle) and Combustion Facilities (square) expected to operate through the end of the year 2000. Size reflects projected tonnage (tons per year).

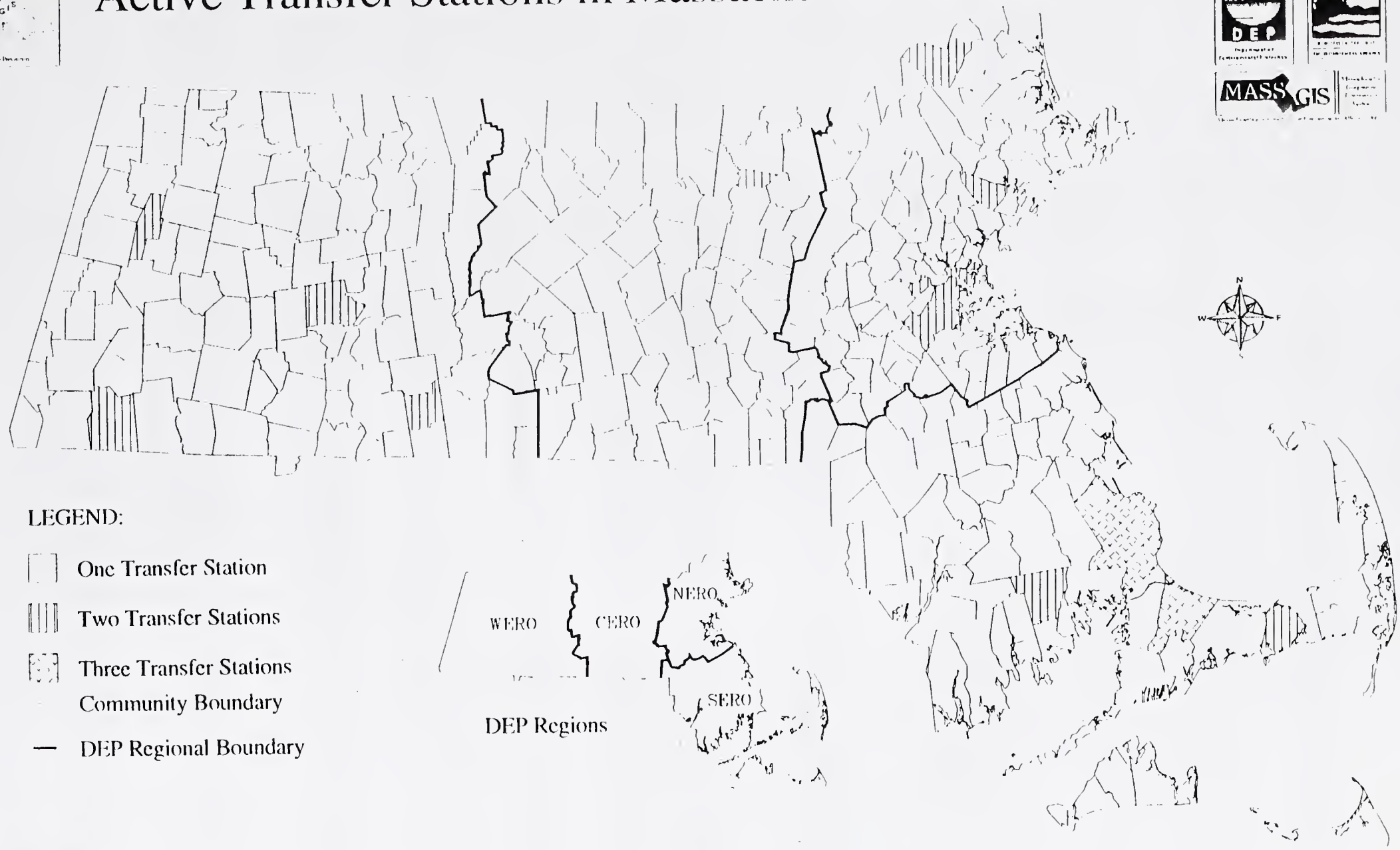
- 150 TPY landfill
- 10,000 TPY landfill
- 50,000 TPY landfill
- 200,000 TPY landfill
- 100,000 TPY Combustion Facility
- 450,000 TPY Combustion Facility
- 1,000,000 TPY Combustion Facility
- DEP Regional Boundary
- Community Boundary



dep/projects/work/sw/template \$work/sw/topfun.wor_2 *March 30, 2000 arichter*

APPENDIX H:

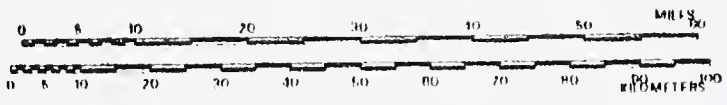
Active Transfer Stations in Massachusetts in 2000



LEGEND:

- One Transfer Station
- Two Transfer Stations
- Three Transfer Stations
- Community Boundary
- DEP Regional Boundary

DEP Regions



Map/projects/work/swtemplate $work/sw/swfacils_2

March 30, 2000 arsher

APPENDIX I
Glossary

Ash Monofill	A solid waste landfill dedicated to the disposal of ash resulting from the combustion of municipal solid waste or the combustion of coal.
Automobile Shredder Residue (ASR)	Generated by metals recycling companies that shred automobiles and white goods for metals recovery. ASR is primarily comprised of plastic, rubber, carpeting, fabric and other non-metallic components.
Chapter 21E	Massachusetts Oil and Hazardous Material Release Prevention and Response Act (MGL c. 21E).
Commercial Solid Waste	All types of solid waste generated by stores, offices, institutions, restaurants, warehouses, and other non-manufacturing activities, or similar types of solid waste generated by manufacturing operations. It does not include solid waste generated in a manufacturing or industrial process.
Composting	A process of accelerated biodegradation and stabilization of organic material under controlled conditions yielding a product, which can safely be used. (5), (6)
Construction and Demolition Debris	Waste building materials and rubble resulting from the construction, remodeling, repair or demolition of buildings, pavements, roads and other structures. Construction and demolition debris includes but is not limited to, concrete, bricks, lumber, masonry, road paving materials, rebar and plaster. (5), (6)
Curbside Collection	Collection at the point of generation of recyclables or compostable materials. (1)
Grasscycling	Source reduction activity whereby grass clippings are left on the lawn after mowing. (3)
Gross State Product (GSP)	A measure of the size of the Massachusetts economy calculated by adding up the value of goods and services produced in Massachusetts in a given year.
Integrated Solid Waste Management	A solid waste management system that incorporates an array of preferred management methods that most appropriately fits the characteristics of the waste stream. (1)
Light-weighting	Reductions in the weight of material used to make packaging (e.g., less plastic in a food container or less aluminum in a beverage can per unit of material contained in the package). (2)

Multi-family	Means a building or complex of buildings in which are located more than four individual units that are used for residential purposes.
Municipal Solid Waste (MSW)	Any residential or commercial solid waste. Refers to wastes such as durable goods, non-durable goods, containers and packaging, food scraps, yard trimmings, and miscellaneous inorganic wastes.
Nonferrous	Metals other than iron, such as aluminum, copper, brass, zinc, and lead.
Pay-As-You-Throw (PAYT)	A system in which residents pay for each unit of waste discarded rather than solely through a fixed fee per residential household or property tax. Also known as unit-based pricing or variable rate pricing.
Paper	Paper products and materials such as newspapers, magazines, boxboard, office papers, telephone directories, bags, and some paperboard packaging. (3)
Plastic	Plastic containers and packaging made from various resins, including PET, HDPE, PVC, LDPE, PP, and PS. (3)
Recycling	To recover materials or by-products which are reused or used as an ingredient or a feedstock in an industrial or manufacturing process to make a marketable product; or used in a particular function or application as an effective substitute for a commercial product or commodity. (5)
Residential Solid Waste	Typical trash generated by households.
Residuals	Waste materials left after recovery of recyclables and/or the physical, chemical, or biological processing of wastes. (1)
Source-separated	Divided at the point of generation into different fractions for disposal, recycling, and composting.
Solid Waste Management	The systematic administration of activities that provide for the collection separation, storage, transportation, transfer, processing, treatment and disposal of solid waste. (1)
Source Reduction	The design, manufacture, purchase or use of materials, such as products and packaging, to reduce the amount or toxicity of materials before they enter the municipal solid waste management system, such as redesigning products or packaging to reduce the quantity of materials used, reusing products or packaging already manufactured, backyard composting, grasscycling, and mulch mowing. (4)

Waste Reduction	Source reduction, toxicity reduction, and recycling.
Yard Trimmings	Deciduous and coniferous leaves, grass clippings, garden materials, shrub trimmings, and brush.

(1) Minnesota Office of Environmental Assistance, (2000). Solid Waste Policy Report. St. Paul, Minnesota.
(2) U.S. EPA (1999). National Source Reduction Characterization Report For Municipal Solid Waste in the United States. EPA530-R-99-034, Washington, D.C.
(3) U.S. EPA, (1997). Measuring Recycling, A Guide for State and Local Governments. EPA530-E-97-001, Washington, D.C.
(4) U.S. EPA (1999). Cutting the Waste Stream in Half: Community Record Setters Show How. EPA-530-R-99-013, Washington, D.C.
(5) 310 CMR 16.02.
(6) 310 CMR 19.0006